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EDITORIAL NOTES—GAS, &c.

Calorific Power Standard—A Dissentient.

THE first note in our columns of actual discontent with the calorific power standard that has been agreed between the Gaslight and Coke Company (though, for reasons stated last week, reluctantly on their part) and the London County Council, will be found in a communicated article. The writer is not opposed to a calorific power standard, "providing" (this is one of two or three points supporting views already expressed in the "JOURNAL") "that in the question of "forfeitures it supersedes the illuminating power standard." No one likes the second penalty test—not even the Gaslight and Coke Company; but, all things considered, most people will agree they did a diplomatic and prudent thing in settling with the London County Council on the terms eventually arrived at, though not arrived at without much discussion. In the article under consideration, however, there are two predominating points. One is that the writer deprecates the action of the Company in accepting a standard of 125 calories net, on the ground that experience in calorific power testings of the Commercial Gas Company's gas, as made at the two statutory testing-places in their district, shows that the standard cannot be regularly and profitably maintained for a 14-candle mixed gas. The other point is the allegation that the Boys calorimeter, which is the prescribed instrument for calorific power testing in London, is not so reliable as could be wished.

We are glad our correspondent has raised these points, because it is in the initial stages of change in procedure such as this that the whole of the *pros* and *cons* of the subject should be carefully examined. But we do not suppose it would be possible to propose any standard of value that would please everybody concerned. The illuminating power standard, as well as the means of conducting the tests, have never from the first been wholly free from attack, and dissatisfaction has clung very tenaciously to them. But regarding the complaint of our correspondent as to the calorific power standard accepted by the Gaslight and Coke Company, it is difficult to see what would be the use of having a standard that has not some correspondence with the one already existing, or one that would impose no real obligation upon a company. Correspondence and obligation appear to be provided for in this instance, on comparison of the standard and its conditions with the official calorific power tests "for information only" applying to the Commercial Gas Company. In criticizing the standard, the writer of the article does not appear to us to have given sufficient thought to the conditions applying to it. The standard figure cannot be taken alone; it must be the standard *plus* conditions, as the history of the agreement with the London County Council makes perfectly clear. It will probably be well to emphasize this at this the inceptive stage of the calorific power standard.

The Parliamentary Committee of the Council tried hard to get the Company to accept an unconditional standard of 125 calories net; but having regard to practically the same points that our correspondent submits, the Company said, "No," and very positively. Their reply in effect was: "The official calorific power tests that have been conducted "for your and our information show that we cannot, with a "14-candle illuminating power standard, work to 125 calories "net; but they do show that we could, as a general rule, "work to that standard, less 10 per cent., before forfeiture "is incurred." The Council's own returns attested the reasonableness of the Company's submission. The 125 calories net less the 10 per cent. has to be regarded in much the same light as 14 candles less the ½ candle margin before the Metropolitan Gas Companies are subjected to penalty. The 125 calories net is the standard to be aspired to; the 10 per cent. allowance is the recognition that there will inevitably be recessions below the standard line; and the additional provision as to the (less than) 6 calories drop below the 112½ calories (taking the average of two tests) on any one day, with the tests of the preceding and the following days brought into the scale to try to average the 112½ calories, is a proper recognition of possible difficulty on occasion. Should the Company find these conditions onerous during the next three years, then there is the provision for an appeal to the Board of Trade. We cannot, from a study of present experiences, see any ground for any particular fear, though, of course, the views of ourselves, and all who agree that in the establishment of this precedent there is nothing, so far as can be seen (other than the unfairness of the dual penalty test), over which there need be any nervous attacks, are subject to modification on the experiences of the penalty testings. Remembering the extent and character of the operations of the Gaslight and Coke Company, the test means more to them than it would do to a supplier with a smaller area and manufacturing operations on a comparatively modest scale; and it would be an insult to the administration of the Company to suggest that they would not have sacrificed the proposals in their Bill rather than put their existing operations under fresh damaging bondage.

By this introduction of the first calorific power standard for town gas, the official returns of the calorific power of the Commercial Company's mixed 14-candle standard gas has been invested with an interest they would not otherwise have possessed. To an observant outsider, there is a curious point about them. It is that the results at the Wellclose Square testing-station are invariably below those at the Parnell Road station. Though that is so, only on five occasions in the first quarter (winter months) of this year have the averages for a week at the Wellclose Square testing-station fallen below 125 calories net, and the lowest of the five is 123 calories. The lowest minimum return for this year is 119·2 calories, and the lowest minimum in the whole of 1908 was 116·7 calories. There is not a single instance in the minima suggesting the danger-line of 112½ calories; and the Company were not in any way working to a calorific standard, nor had they, in respect of this quality of their gas, any menacing penalties hanging over them. In fact, looking back to the beginning of 1907, there is not a single occasion on which a forfeiture would have been incurred, in ordinary working, by the application of the terms pendent to the Gaslight Company's calorific standard. The writer of the communicated article remarks on the difficulties there may be when, in foggy or in frosty weather, there has to be an increase above the normal of the use of carburetted water gas. It may be taken that during the week ending Jan. 30 last, these conditions obtained in the Commercial Company's district. There were in that week heavy consumptions due to dense fogs and cold. There was no minatory calorific power standard suspended over the Company; the only restriction to liberty was illuminating power. The net calorific power results at the two stations that week were: Maximum 126·6 and 127·2 calories; minimum 124·4 (at both); average 126 and 125·6. The illuminating power was: Maximum, 14·89 and 15·11 candles; minimum, 14·19 and 14·24; average, 14·39 and 14·68. On these figures for a foggy and cold week, there does not appear to be much to disturb the equanimity of any one, under the conditions of the new test.

The author of the communicated article also draws attention to the fact that on no occasion during the current year have there been less than two calorimeters out of a total of 22 marked in the returns as being "under repair;" and, on this testimony, he imputes unreliability to the Boys instrument. Is he altogether fair in his deductions from the printed returns for this year only? If we look at the returns for 1907 and 1908, it is surprising how infrequently these instruments (which are in daily use) were marked as being "under repair." The unbroken continuance of the records during those years, and the fairly uniform character of the weekly maximum, minimum, and average values

returned, are to our mind extremely creditable to the designer (Professor Boys). Calorimeters like other instruments in constant use cannot go on without some overhauling and repair; and it would seem that this year several of the instruments have been taken in hand. Nor is it quite proper to say, without qualifying the statement by explanation, that on no occasion during the current year have there been less than two calorimeters out of a total under repair. There is truth in the statement, owing to what appears to be the absurd length of time the instruments were away being repaired. Ten of the instruments were out of use from six to ten weeks during the quarter—time enough, we should say, to have remade them over and over again. There are some stations at which there has never been a break in the returns, nor any announcement as to the instruments being under repair, from the time to which we have carried our research—January, 1907. It may be taken that, with penalty testing for calorific power, the Gas Examiners and the Company will ensure that the instruments are in good working order. A penalty could not be enforced on the authority of an instrument shown to be defective.

We reiterate that, while dual penalty testing is the worst feature about this standard calorific power precedent, there is, in view of the terms attaching to the standard—basing judgment on the evidence available through the tests conducted for information only, but, we take it, with exactitude—no ground for the apprehension of the author of the article that has drawn these comments.

The Future of Tar.

In another column to-day an article appears dealing with the largely-increased production of tar which may be expected in the near future, and the urgent need for greater energy in the development of fresh outlets for tar, or its chief component, pitch. The writer of the article does not presume to offer an adequate remedy for the present depressed prices; but, as a step in that direction, he suggests the briquetting, or to be more precise, the "eggetting" of coke breeze and pitch. There is nothing new in the idea; but fresh conditions affecting tar prices render the resuscitation of an old idea welcome, especially if it promises improving values. The author assumes that a 5 per cent. surplus of coke breeze would, if made up into compressed fuel, absorb the pitch produced by 66,000 tons of tar. On his own showing, however, there are now no less than 1,068,000 tons produced from gas-works and bye-product recovery ovens, with a prospect of an increase (say, during the next ten years) to 1,800,000 tons. Clearly, the satisfactory "eggetting" of gas-works breeze will only be—to use his own description—a "little help." With the extended sales of broken coke for domestic use (as to which more assiduous efforts are being made in all directions) will follow, as a necessary corollary, an increased output of breeze from the screens of coke-breaking plants. Apart from the mere idea of improving the commercial value of tar, therefore, a further means of satisfactorily disposing of coke breeze, such as our correspondent indicates, may be welcome on this ground alone. Tar prices are not entirely governed by the law of supply and demand. Those outside firms into whose hands its distillation has chiefly drifted, are responsible for a good deal of manipulation of the markets. It is a curious fact that a sharp rise in the port value of pitch has frequently been seen very quickly after the bulk of the contracts with gas undertakings have been settled. Those undertakings that sell on the basis of a monthly analysis of the products are in this respect more fortunate than those who sell at a fixed price, inasmuch as they at least share in any such improvement in values. The time is opportune for a thorough consideration of the question of tar in all its bearings as it affects gas undertakings.

Informal but Informative.

Though in the main dealing with but a few of the practical details of gas management—technical and commercial—it was a very suggestive address with which Mr. David Vass, in the capacity of Chairman, opened the debate at the informal meeting of Scottish Gas Managers last Wednesday. The Chairman carried the idea of informality well through the prepared opening, and yet treated, with studied thought, the points that he compassed in it. The most controversial subject of all was that of corporation *v.* company ownership. It is an old topic, but it is rarely introduced at a mixed meeting of company and municipal gas managers, as the usefulness of discussion is limited by the fact that the expressed views of officials, whatever their inner thoughts may be, must be largely moulded to the service within which their lot is cast. There are few gas managers to-day who, if they were called upon to do so, could not say something sensible and to the point on either side of this polemical subject. Mr. Vass is in municipal employ; and the sum and substance of his argument is that, while upon the transfer of a gas-works, during the period in which the purchase money is being repaid, consumers are worse off in respect of capital charges (including sinking fund) than they would be under company management, yet as progress in business is effected, the charges will diminish, and, after the repayment period for the purchase-money, the charges will go completely over in favour of the corporation. The period during which this repayment of the purchase money is proceeding is the one, according to Mr. Vass, during which the consumers have to pay more for their gas under municipal management than they would have to do under a company; but there is the compensatory thought that, at a long distance from the date of transfer, there will be a gain through the cessation of the charges for the purchase capital. It is all very well to construct as a pastime hypothetical cases of the kind found in the address, and to speak of what should happen theoretically, but which, and not infrequently, does not develop in actual experience.

In the first place, it may be admitted that, averaged from the aggregate, the amount of capital employed by companies per 1000 cubic feet of gas sold is higher than that of (also averaged from the aggregate) municipal authorities; and this is largely accounted for by the differences in the geographical and the topographical characteristics of the two classes of undertaking, and partly by the large conversions of capital to a uniform basis that have occurred in companies during comparatively recent years. There can be no fair comparison between the two without selecting undertakings of a fairly comparable character. There were in 1906-7, 491 company undertakings in the United Kingdom, a large number of which are of small size with proportionately large capitals, compared with 272 municipal concerns in, for most part, districts of excellent character for gas supply. But we do not think Mr. Vass has, in his calculations, done company undertakings full justice, in that he has put the dividend required on the capital invested in the works at a level 5 per cent. On capital raised in these times, it is nothing like this amount, if the dividend and interest are averaged over the whole of the money invested. In the last Board of Trade returns, with a share capital of £72,008,451 in the 491 company undertakings, there was also invested in the business £14,467,842 of loan capital, and £5,863,406 premium capital, on which latter no dividend is paid. Therefore, when it is considered that loan and premium capital diminish the average of 5 per cent., it is seen that the municipal consumer is placed in a worse position than that represented by the naked and unqualified figures in the address in respect of the amount of capital charges to be met during the period of purchase-loan repayment.

Mr. Vass, we understand, is treating the matter generally, and not confining himself to Scotland, so let us go farther. The municipal consumer is not actually in these days being released from capital repayment charges in anything like the beautiful geometrical proportion that the Chairman suggests in his computations. In the case of the municipal undertakings of the United Kingdom, the capital employed (less the sum repaid) was in 1886-7 12s. 2·8d. per 1000 cubic feet of gas sold; in 1896-7 it was 9s. 6d. per 1000 cubic feet; and in 1906-7 it was 9s. 1·7d. It is seen from these figures that, whereas between 1886-7 and 1896-7, the capital employed per 1000 cubic feet diminished by 2s. 8·8d., during the succeeding decade ending with 1906-7 there was only a reduction of 4·3d. per 1000 cubic feet, albeit the increase in sale by municipal undertakings was 19,593,744,000 cubic feet in the latter decade, as compared with 16,762,069,000 cubic feet in the decade preceding. This increase is in part due to the difference in the number of undertakings—69 being added in the second decade, compared with 46 in the first. Let Mr. Vass, too, run down the figures, in any general analysis of accounts, respecting the capital charges per 1000 cubic feet for municipal undertakings, and he will find that his figures are frequently exceeded by many substantial concerns. The point, however, that it is desired to make is that actually, in respect of release from capital charges, the municipal gas consumer is not, on the showing of the

Board of Trade returns, deriving the same ratio of benefit in reduction that he did formerly.

Of course, Mr. Vass in this matter does not tell the whole tale of the differences between the charges upon the municipal and the company gas consumer. If capital charges—interest and repayment—comprised the whole of the charges to which the municipal gas consumer is subject, there would not be so much to complain about by him during the years of the repayment of the purchase money. But upon those charges is the sum taken in aid of the rates in the majority of places where the gas-works are municipally owned; and this is a hardship upon which, on many occasions and in many places, there has been eloquent discourse. The point is only referred to here to show that the capital charges are not the beginning and the end of the difference in position between the company and the municipal consumer; and this diverting of money to purposes foreign to the business makes the burden all the greater for the municipal consumer, though already at a disadvantage in respect of the capital charges during the purchase-loan repayment period. It is a consideration too often lost sight of by gas consumers who, ignorant or ill-informed in regard to this particular subject, vote for municipal acquisition, that they are the people who are going to sink money without obtaining any return for it themselves—the advantage, if there is any, being projected far into the future for posterity. They are befooled, because they are ignorant on these matters. Mr. Vass himself very properly points out that the gas consumers on municipal acquisition have to pay much more than they would do under company administration, for the questionable privilege of owning the gas-works, and providing for future generations a better condition of things than they themselves enjoy. Perhaps there is consolation in believing that in this way one is acting the part of a benefactor to posterity; but in the case of our own individual investments we are common-sense enough to prefer that they should bring in an immediate tangible return.

The conditions, moreover, for the gas consumers during the purchase-loan repayment period are being made worse and worse. At one time—say in the seventies—periods for repayment of purchase loans were allowed of 55, 60, 70, 75 years, and there is a case of 85 years on record; ten years or so later, there had been a shrinkage of the period to between 30 and 50 years; and latterly periods of only 30 to 40 years have been the fashion, with a few below. The term is to be still further narrowed down. The authorities both in Parliament and at the Local Government Board have set their minds on this. Though in the Swinton and Mexborough case this session, 35 years have been allowed, the Chairman of Ways and Means (Mr. Emmott) has made the significant announcement that the authorities of the House are set against any increase, and, in fact, are rather bent on a decrease, in the number of years they are likely to allow for the purchase of gas-works, "because of the some-"what doubtful character of the undertaking in the future." This reason for curtailing the period was briefly discussed in our "Notes from Westminster" last week; but further reference to Mr. Emmott's remark is made here to show that, though the days of the purchase-loan repayment period have, generally speaking, never been palmy ones for municipal gas consumers, purchase under the conditions of to-day will put upon the consumers a heavier burden before deriving any direct advantage—if advantage there is to be eventually under a municipally controlled gas undertaking (particularly under the modern composition of local authorities), as compared with a well-ordered gas company working under the sliding-scale. But, after all is said, the question of municipal *v.* company ownership in respect of the effect upon the gas consumer is not to be settled by reference alone to the relative conditions of the capital account and charges, important though they be.

Passing from this topic, many others in the address claim thought; but of these, the premier place must be given to what the Chairman has to say on the subject of developing business, which development has, or should have, some relation to reduced capital charges. From the facts presented to view, it is abundantly clear that Mr. Vass is in the felicitous position of having a Committee of wise business men, who deal with the trading of the concern upon purely commercial principles. Their policy and that of Mr. Vass is to secure business, and not let it go over to competitors, if retention only calls for an amount of sacrifice that will not occasion injury to the ordinary consumers, but will benefit them by usefully employing plant in the day that their own demands at the top point of night requirement have called into existence. One power consumer wavering between producer gas and town gas has been finally brought over to the latter by considerate treatment. Again the plan that Mr. Vass has adopted to increase his roll of consumers, and make a material addition to his ordinary consumption, will by its success induce others to go and do likewise. He had a list of houses drawn up in which gas was not being consumed; and upon these houses a systematic campaign was conducted. The roll gave a total of 1345 premises not on the books of the gas undertaking. Of these, premises unsuitable or lighted by electricity account for 131; leaving 1214. Of these, Mr. Vass stands a good chance of getting close upon 1000; as a matter of fact, in six months the department dealt with no less than 790, to which he attributes an increase in consumption in nine months of between 7 and 8 million cubic feet, despite bad trade. Mr. Vass is not above emulating the good examples of others. Not a few will do well to emulate him in this respect. With this point—and it is an excellent one—his address must be left. The quality of the several other features may be judged by those already noticed.

The Evolution of the Illuminating Engineer.

A LITTLE friendly criticism has been passed by "The Illu-"minating Engineer" on some of the points raised in the editorial article in the "JOURNAL" for March 16 on "Illu-"minants and Illuminating Engineering." We are pleased to see that there is recognition of the spirit in which that article was written, which was not one of antagonism, but of doubt as to the ultimate influence that the Society of Illuminating Engineering will have in developing illuminating specialists unconstrained by interest and bias, and in dispelling ignorance from the public mind. We have to confess that, while still admitting there is scope for useful work being performed by such a Society in the study of the subject of illumination in all its branches, the criticism of our contemporary only hardens the doubt as to the attainment of the ideals that the progenitors of the Society have set before themselves. It should be made absolutely clear that our wish for the Society is an abundant success; and, if our current fears are in the result proved groundless, we shall be the first to acknowledge it, and to congratulate the Society and its originators upon having attained more than is now believed to be possible.

In a measure, there is in our contemporary endorsement of several of the points made in our previous article. The founders of the Society recognize that its ideals are not easy of realization—that the way to attainment is foreseen to be long and tedious, and that the time is remote before (if ever) the Society will be able to claim that directly, through its intervention and labours, an impression has been made on the public mind in the matter of displacing unscientific illumination by its opposite. But in saying this, it must not be taken to be an admission that the art of artificial illumination has been neglected by those technically concerned in it, or that it is altogether on wrong lines. Recent Cantor Lectures prove the contrary; and on all hands, in all spheres, there are many exemplary installations. Confessedly, however, there is much also that is an abomination in the sight of those who know what illumination ought to be. The reasons for this are several, and are known to all who will be reading these lines. But as to the realization of the aims of the Society. It is seen from the article in the "Illuminating "Engineer," that there are two stages of growth in connection with the achievement of ambition—one of which must succeed the other; and the second can only develop on the successful issue of the first. The first stage is the creation of non-partisan illuminating engineers; and until such experts are brought into existence, nothing more effective than is being done at present can be accomplished in bringing the public mind, on the question of illumination, into a proper state. "The development of such an expert," remarks our contemporary, "must be very gradual." There is a long wait foreshadowed in these words. And again—

> **It must be recognized that a man in the front of his profession, and identified with a particular illuminant, cannot be expected abruptly to modify his course of work, even though his point of view be enlarged and his sympathies widened. Self-interest and business connections alone render it difficult for him to assume immediately the impartial attitude of the ideal illuminating engineer. It is therefore to the younger generation who are growing up in this new atmosphere of toleration, that we must look mainly for the specialist of the future.**

There is not very much encouragement here to look with

confidence to those at present engaged in the commercial interests of the artificial illuminants to assume a strict neutrality and broad benevolence that shall be beneficently operative over not one but the various illuminating agents. This is a point that has been made before in these columns; and as to the younger generation who are growing up in this "new atmosphere of toleration," and to whom we must look for the illuminating specialists of a distant day, we regret to say that, if we except perhaps two or three that are with Mr. Gaster in this matter, the representatives of this particular section of the younger generation have not crossed our path. But of those of this "younger generation" wherever they are to be found, and who it is supposed to-day will not be wedded to any particular illumination system, we say deliberately they will not be able to afford to be philanthropic or altruistic any more than their predecessors. They must live, and to live they must attach themselves to the interests of a particular industry. Illumination—something of daily necessity, something that must be bought, and something over which every man will suit his own fancy according to the means at his command—is a field in which few men will find they can secure a competence as free-lances; and they will, wherever operating, always have as strongly placed opponents the experts of one or other of the industries supplying illuminating agents. This is a practical subject that must be treated "in the light of "commonsense and reason," and, though it may seem banal, from a practical standpoint.

We do not for a single moment doubt the sincerity of Mr. Gaster and his colleagues, nor the impartiality of the platform that they have provided, and will continue to provide, so long as they direct the operations on that platform. But at the present time, we can urge ourselves no farther than the belief that the Society only, but usefully, adds another to those already in existence at which papers on illumination topics can be presented—admittedly not from one platform on all topics referring to the rival illuminants. That the Society will have any influence in converting any lighting expert from what may be regarded as the error of his present ways in illumination is altogether a moot point. Or that it will achieve much in changing the ways of the public in this matter, we cannot entertain a great deal of hope. The idiosyncrasies of human nature, physical differences, the length of purse, the love for demonstration, the desire to attract notice and to outshine, individual predilection and fads and fancies, prejudices and interests will have greater weight than the illuminating engineer. Local authorities as present constituted hate more expert fees than in their view are absolutely necessary; their own paid officers and their own ideas suffice, they consider, for their needs. The private householder and the shopkeeper believe they know best their own requirements. There are many excellent institutions with excellent objects, all working for the elevation of the human virtues. But the public do not respond; and vice is as rampant as ever. The work of converting the public to scientific illumination is a big, and not a popularly attractive, one. Past history (we say this having exercised the caution of reconsidering our views) will probably be repeated. Nevertheless our best wishes go with the Society; but we hold to the right of our opinion, and to expressing it now.

An Illegal Deficit Charge.

The Hastings Corporation have been caught napping by the Hastings and St. Leonards Gas Company. The Company have been good friends to the ratepayers hitherto in exposing the reckless manner in which the Corporation have pursued the business of electricity supply in the borough. They are like inveterate gamblers who engage in fresh hazard in the hope of retrieving the losses of previous risks; but, as a general rule, the result is worse than it was before. The financial position of the Hastings electricity undertaking is distinctly more deplorable now than formerly; and yet the Corporation have continued to blindly pursue the course that has made it so, and show resentment when anyone has dared to suggest the impropriety of their procedure. But the Gas Company, in their own interests as large ratepayers—probably the largest ratepayers in the borough—have dared to face the Corporation over this matter; and in so doing, at some expense, they have kept their fellow-ratepayers informed of the facts of the position, and succeeded in putting obstacles in the path of the Corporation in their headstrong career. Hitherto this has only meant the adoption of fresh tactics on the part of the latter—such as, on the refusal of the Local Government Board to grant loans for extensions of street electric lighting, the payment out of the rates of the cost. The Company have, however, now compelled the Corporation to abandon a piece of illegality, which they were apparently unconsciously proposing to enter upon, inasmuch as they found it necessary to obtain Counsel's opinion before they could realize the strength of the Company's action.

To put the matter briefly: The Company gave notice of an appeal to Quarter Sessions against the general district rate made by the Council on March 5, on the ground that it was bad in law, as it included retrospective charges, incurred and due more than six months before the rate was made; this being contrary to section 210 of the Public Health Act, 1875. For example, there was included a sum of £1616, being a deficit on the electric light undertaking for the year ending March, 1908, and sums being deficits incurred prior to September, 1908. A further point was that the Council did not cause, contrary to section 218 of the above-named Act, an estimate to be prepared of the money required showing the several sums in respect of which the rate was to be made, and in particular of the money required for the electric light undertaking. Counsel advised the Corporation that the Company have ground of appeal in respect of the deficit on the electricity undertaking prior to March 31, 1908; this being a debt incurred more than six months before the making of the rate. The same objection applies to the items in respect of part cost of altering the front line of electric lamps (£711), and installing electric arc lamps in Queen's Road and Cambridge Road (£72). The Corporation have, following the advice of Counsel, amended the rate in these respects. Whether this has given satisfaction to the Gas Company has not transpired at the time of penning this reference to the matter; we therefore limit our remarks to the admissions of illegality. The point is one that may be useful to other gas companies, who are called upon not only to face rate-aided competition, but as ratepayers to give material support to the competing concern. Truly municipal electricity supply has put gas companies into a peculiar position. It has imposed upon them the *rôle* of guardians of the public interests against the elected representatives of the people, who, in this particular branch of municipal trading, look after the interests not of the whole body of ratepayers, but only of the small section of ratepayers who are users of electricity.

A Lesson to Trades Unionists.

That it is not even now possible for Trades Union officials to do just whatever they please in connection with disputes with employers, was exemplified lately in the King's Bench Division of the High Court of Justice, when the General Secretary of the National Society of Amalgamated Brassworkers and Metal Mechanics was defendant in an action for libel. Circulars had been issued, signed by him, in which a certain Company were accused of "tyranny" in dismissing employees who had used their influence to induce other workers to join the Union. It was proposed that details of this "tyranny" should be sent to members of the House of Commons. The Managing Director of the Company was called, and stated that they had never raised any objection to their employees being members of Trades Unions. The Company had, in fact, always been on excellent terms with their workers, until he had complaints of intimidation by certain men trying to induce the employees to join the Union in question. These complaints proved to be well founded; and he discharged three men who had been reported to him as the ringleaders in the system of intimidation. He then issued a circular to the employees telling them they were free to join Unions, but that he would not have intimidation. It then transpired for the first time that the men dismissed were respectively President, Treasurer, and Secretary of that branch of the Union; and on a refusal to re-instate them, the alleged libels were published—although it had been made clear to the defendant that there were still Trades Unionists among the employees. After this evidence, defendant's Counsel recommended a settlement; and it was agreed that he should pay the costs of the action, and undertake that the allegations should not be repeated—the Judge remarking that after what the Managing Director had said "the result of the action was beyond doubt." Which, in the light of the facts revealed, is the party having the best right to complain of tyranny? Certainly not the Trades

Union official who had expressed the intention of appealing to Members of Parliament. The action is only one more instance of an unjustifiable accusation being made by a labour leader against an employer in the course of a dispute; it is interesting as showing that baseless assertions of this character cannot always be made with impunity.

The Trade Boards Bill.

Any serious effort at the abolition—or perhaps it would be better to say the elimination as far as possible—of the evil of "sweating," is deserving of the earnest consideration of all who are concerned with industrial occupations. For this reason, the Trade Boards Bill, whatever may be its shortcomings, will be certain to receive careful attention. It is a Bill for the establishment of Trade Boards to consider, as occasion requires, any matter referred to them by a Secretary of State, the Board of Trade, or any other Government Department, with reference to the industrial conditions of the particular trade concerned; and they will fix minimum rates of wages for time work for their trades, and also, if they think fit, settle general minimum rates for piecework. If a Trade Board report to the Board of Trade that it is impracticable in any case to fix a minimum time-rate, the Board of Trade may, so far as that case is concerned, relieve the Trade Board of their duty. Before finally fixing a minimum time-rate or piece-rate, the Trade Board will give public notice of their intention, and consider any objections lodged with them; and they will also give public notice when such rate has been finally determined upon. Provision is made for the variation of any decision, where deemed expedient. A Trade Board shall, on the application of any employer, fix a special minimum piece-rate to apply to persons engaged by him in cases to which a minimum time-rate but no general minimum piece-rate is applicable. After the lapse of not less than six months from the date when a Trade Board have given public notice of a rate finally fixed by them, the Trade Board may, if they think fit, apply to the Board of Trade for an order making the minimum rate obligatory in cases to which it is applicable on all persons employing labour and on all persons employed; and the Board of Trade, if they are satisfied that it is expedient, will make an order. Penalties are, of course, provided for not paying wages in accordance with a minimum rate which has then been made obligatory. That this method of settling an admittedly extremely difficult problem will not prove by any means universally acceptable is shown by the fact that the Employers' Parliamentary Council have addressed a memorandum on the Bill to the President of the Board of Trade, in which they remark: "It may fairly be assumed that the average rate of profit in the so-called 'sweated' trades is not materially higher than the average rate of profit in trade generally. If it were so, capital would be attracted into the 'sweated' trades until the rate of profit reached the normal level. If, then, the profit earned by employers in these trades is not in excess of the profit earned by other employers, it would appear that there is no source from which an increase of wages can come except by the enhancement of the price of the product, which would lead to increased competition from manufacturers abroad, who are not subject to the restrictions contemplated, and hence to the ultimate extinction of the trades in this country." The Council also think it is doubtful if any scheme for the fixing of wages would be in practice enforceable, and that a minimum wage would not increase the total amount paid in wages; and they specially object to a provision by which the Board of Trade are to be empowered to set up a Wages Board for any trade whatever. They also point out that many of the industries to which the Act might be applied have already established voluntary agencies to settle disputes.

Mr. R. Hesketh Jones, after occupying seats on the Continental Union and Union des Gaz Companies' Boards for upwards of sixteen years, has resigned. Mr. A. F. Phillips, M.Inst.C.E., who is already a Director of the former Company, succeeds him on the Board of the Union des Gaz. At the Board meeting of the Continental Union Company last Tuesday, a resolution was passed stating that the Directors accepted Mr. Jones's resignation with much regret; and that they desired to record on the minutes their deep sense of the value of the assistance that he had given his colleagues, and the expression of their thanks to him for the willingness with which he was at all times ready to render the Company special services.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 112.)

THE Stock Exchange has just concluded an unusually bright and buoyant week, all the more remarkable because it was a truncated portion of a week to be followed by a holiday of several days of inaction—a phase generally productive of increasing quietude and cautious closing. But the markets gave full play to their elasticity in the sunshine of cheap money and Eastern pacification. The opening day afforded full promise of what was to come. Buyers in many markets were in force; and all the leading departments were on the rise. On Tuesday, the volume of business was brisker, and the advance in prices proceeded merrily. In Gas issues, advances were remarkably numerous, and were to a large extent in the Suburban and Provincial group—ranging from 7½ in Hastings downwards through Brentfords, Brightons, British, South Suburban, and West Ham. Wednesday was a strong and active day; the gilt-edged division being conspicuous, followed by the other leading markets. On Thursday, though the closing day and the very eve of the holidays, the flowing tide was still running very strong. Nothing seemed to come amiss; and so things went on up to the close. In the Money Market, the utmost ease ruled, and discount rates gave way materially. Business in the Gas Market, though somewhat slow at the start, grew brisker with the rest and compiled a very fair average in the end. The strength, as already indicated, was most marked; and rises in quotations make a long list. In Gaslight and Coke, transactions in the ordinary ranged from 102⅜ to 103⅜—a rise of ½. In the secured issues, the maximum marked 88¼, the preference 104¾ and 105½, and the debenture from 85¼ to 86. South Metropolitan was quiet and strong, realizing from 122 to 123½ (a rise of 1), and the debenture made 85¾. In Commercials, the 3½ per cent. changed hands at 102¼ and 102½, and the debenture at 82 and 83. Among the Suburban and Provincial group, British made from 42¼ to 42⅜, West Ham from 118 to 119½, and ditto debenture 107½ and 108½. In the Continental companies, Imperial was steady at from 182½ to 183½, and the debenture marked from 95 to 96½—a rise of 1. Union was done at 102, and Malta at from $4\frac{7}{16}$ to $4\frac{15}{16}$. Among the undertakings of the remoter world, Buenos Ayres recorded 13¼ and $13\frac{7}{16}$, Hong Kong 18¼ and 18⅜, Primitiva 6⅜, ditto preference $5\frac{7}{32}$, ditto debenture 97, River Plate 14⅛ and $14\frac{5}{32}$, and San Paulo $13\frac{5}{8}$.

ELECTRICITY SUPPLY MEMORANDA.

The Question of Charge—Tariff Complications—The Metallics and Increases to Lighting Consumers—Unequal Burdens—The Inadequate Margin of Charge—A Consumer's Comparison.

THERE are some significant happenings in the electrical world associated with the question of the prices charged for electricity supply. Discussion proceeds over the policy of increasing the charge, in view of the reduced income derivable from those consumers who are using metallic filament lamps in place of carbon filament ones. In the case of some concerns that have not already taken the step, the position will before long resolve itself into one of Hobson's choice; for even the best concerns—those with a large and diversified custom—have substantial evidence in their accounts of the effects of modern changes. Great as is Liverpool, broad as are the opportunities of the electricity undertaking for recuperation, the Consulting Electrical Engineer (Mr. A. Bromley Holmes) wisely looks the position full in the face, and admits that, however beneficial the metallic filament lamps may be in the future, in the present electricity suppliers must contemplate a reduced sale to consumers for lighting. Under these circumstances, Mr. Holmes cannot recommend any alteration in the charges to ordinary consumers; but he desires that the long-hour customers of the department shall have more consideration. He therefore proposes that the long-hour power consumer shall have the option of a special alternative rate of £4 per kilowatt on the rated capacity of the plant installed, together with a charge of ¼d. per unit of electricity consumed; or the fixed charge can be £8 per kilowatt of the maximum rate of supply actually observed, with the additional charge per unit. For lighting consumers who guarantee to take not less than 100,000 units of electricity per annum, the charge is to be calculated on the basis of a payment of £8 on the maximum rate of supply actually observed, and 1¼d per unit of electricity consumed. There is a growing liking among electrical engineers for this system of charging a fixed rate per kilowatt, and in addition a small one per unit of electricity. The knowledge of a definite income from a fairly considerable installation is attractive to them; but the consumer looks at the matter differently. Unless he has an assured use for a large quantity of energy, he does not, as a rule, approve the idea. The payment of a lump sum quarter after quarter for something intangible does not appeal to the ordinary run of trade and manufacturing consumers whose requirements are subordinate to the rises and the falls of business. There is, too, about the system an appearance of complication, which is uninviting. If a system of charge departs from the customary practices of trading to such an extent that the ordinary consumers cannot readily understand it, it must have the tendency of making the electrical business unpopular. There is some room for sympathy with the Liverpool

electricity consumer who wrote recently asking for some simple proposition of a sliding-scale of price, according to the quantity of electricity used. It is the ordinary custom of business; but then the electricity business is largely carried on by those who look upon it as an extraordinary one. The more they harbour and cultivate that idea, the worse for the industry.

Now, with more directness to the point as to the increase of charges owing to the effect of metallic filaments on the revenues of electricity undertakings. The question has been considered in many places; but in some those responsible for the electrical administration are, in this matter, sitting on the fence, and cannot determine which side to get down. They do not like the idea of increasing the charges, in view of the pressure that modern gas lighting brings to bear on all sides. They picture increases as putting practically a dead-stop to the lighting business. But what nonsense! Why such fears? Electricity at any price, the electrical man preaches, is better than gas lighting at a gift. Just think of that carbon monoxide, that sulphuretted hydrogen, those dreadful sulphur compounds, and that debilitating carbonic acid that we have heard so much about lately in abstract terms from the electricians, but from which they cowardly sneak when asked for substantiation. With such assumed disadvantages, gas ought not to be capable of raising despondency among electricians no matter the price of electricity. In passing, we notice that the ancient sayings of Dr. George Carpenter, in regard to which we made a few observations last week, appear under the heading of "The Triumph of Electricity," on the second page of the wrapper of "The Unit"—a little pamphlet that has been distributed by the Urban Electric Supply Company, Limited, with which Edmundson's Electricity Corporation, Limited, have something to do. Cannot householders have something fresher than this stale and out-of-date pabulum now? However, we are drifting from the main subject. Why, it may be repeated, fear an increase in charge to the consumers when, on the authority of electricians, unequalled excellence in so many ways is on the side of electricity? The position is not a congenial one for electrical managements; and those who have the final word to say in many cases fear to say it. Dublin affords example. The City Treasurer and the City Accountant and the Lighting Committee coincided in asserting that an increase in price was desirable, and recommended accordingly. The Corporation have quashed the recommendation. But shrinking revenues and growing deficits are accelerating decision in other cases. Hastings, for example. The Corporation there cannot from the revenues of the Electricity Department meet the whole of the charges for sinking fund, though no provision is being made for reserve and depreciation funds. The Committee have at length accepted the inevitable, and, with the consent of the Council, have decided to raise the price to all consumers to 6½d. per unit, and the charge for arc lighting by 1d. per unit. Consumers of more than £100 worth of energy are, on all payments in excess of the £100, to be allowed 15 per cent. discount. Something of the kind is what must result in many places from the events of the present.

In considering the question, however, of the increase in the lighting rates, the fact should not be lost sight of that the diminished revenue per unit that many undertakings are now experiencing is due to the growing proportion of the power and industrial consumption at low rates, and the unremunerative prices at which some undertakings are connecting up public lamps, radiators, and so forth—the accumulations of the low-priced business all tending to the one end. It is therefore unfair that the provision of compensation for the declining revenue should be put on the backs of the lighting consumers alone on account of their use of metallic filament lamps. The prospect, however viewed, is not a pleasant one. Mr. W. Harrison Cripps, the Chairman of the Metropolitan Electric Supply Company, was saying the other week that, though the electric supply industry has been in existence between twenty and thirty years, the total capital invested in it has never returned 5 per cent.; and with the singular prices charged for some portions of the business done, and the reducing revenue per lighting consumer using metallic filaments, the 5 per cent. on the whole of electrical investment is not likely to be in sight yet awhile. As a matter of fact, some of the lighting consumers do not nowadays, through the adoption of metallic filament lamps, use sufficient current to give a return on their share of the capital. Under present conditions, therefore, an increase of consumers to compensate for reduced consumption has not the same effect as it would have had under the old order of things. However, it is claimed that the entire burden of the reduced revenue should not be laid on the lighting consumer. That the consumer of low-priced current for power and other purposes is largely answerable for the present position, is shown by calculations, made by the "Financial Times," from last year's accounts of the London Electricity Supply Companies. The quantity of current consumed went up during the year by 10¼ per cent.; and the number of new connections—lighting, power, &c.—were equivalent, expressed in eight-candle power lamps, to 7½ per cent. But—and this is the important point—the gross receipts from sales have scarcely advanced by 1¾ per cent. Looking at the relation of the 10¼ per cent. to the 1¾ per cent., the influence of the power and other low-priced electricity is seen. The average receipts per unit during the year were 2·41d. against 2·6d. the previous year, or a loss of nearly ¼d. per unit. This ¼d. represents a considerable sum on the total business. The Kensington and Knightsbridge Company last year paid 8 per cent., against 10 per cent., and the Metropolitan Company 5½ per cent., against 6½ per cent.

Touching further the question of low power prices, the Newcastle-on-Tyne Company—of superlative character as is their area of supply—have proved by last year's results that power supply at close-cut rates is a speculative business in which shareholders must be prepared for some sharp variations in the income from their investment—that is to say, when a company engaging in power and bulk supply arrive at a profit-making stage, which few of them have yet done, and, in consequence, are anxious to get hold of a quantity of the fatter lighting business to give a little backing to the leaner power business. Though the Newcastle Company have the pick of territory in the whole country for power supply, they have proved in the past year that their business is done at rates so fine and sensitive that they will stand but little change towards uncharitable conditions before the return on the capital is uncomfortably curtailed. The year's working has caused the dividend to recede from 8 per cent. to 2½ per cent. The reasons ascribed for this deplorable state are bad trade (and everybody knows it has been bad on Tyneside), increased coal costs (8s. 6d., against 6s. 2d. in 1906), and labour disputes. The increase in connections in the year was from 92,764 to 111,484 horse power; but the profit was only £73,063, as against £85,252 in 1907. The number of consumers advanced by only 25—making 4839. This is the Company, we remember, that started the ineffective "Electrical Bulletins," and once burst out into a parody on a well-known nursery rhyme, under the title of "Ten Little Mantles." This happened some few years ago; but little good it has done them. Throughout the big sphere of their operations, the Company last year only sold an additional 174,000 units of electricity for lighting! The largely reduced dividend is not the only matter that is troubling the minds of those interested in the concern. There are doubts whether the Directors are doing the right thing by the future in the way they are dealing with depreciation. It is also disquieting to the shareholders to find the Board declining to publish their figures as to gross revenue and costs. The reason adduced for this secrecy is that the Company's figures were constantly being employed to their disadvantage in inducing people to put in private generating plants. What a confession of weakness! It does not say much for the Newcastle Company if they are frightened at their own figures having a bad influence in diverting custom from them to private installations. However, a hard blow has been given to centralized power supply by the Newcastle undertaking not being able to hold its head higher than this in times of stress; and it will do more than anything else has done in recent times in depressing public confidence, and in restraining the putting of capital into such undertakings. Newcastle has always been held up as an example of what may be in connection with other power concerns, though unfairly in view of the peculiarly excellent character of the district. One further point. If the power business is speculative for private enterprise, it must be even more so for municipal undertakings working on borrowed money, and treating the repayment of that money as representing depreciation.

In the "Pharmaceutical Journal" recently, a correspondent raised the inquiry as to the relative cost of gas and electricity; and in reply Mr. W. T. Gardner, of Bournemouth, published figures as to the cost per 1000 candle-hours—stating that the figures were "practical results from every-day use of both illuminants." These are the figures:

—	Electricity.	Gas.
Price	6d. per unit	5s. per 1000 c.f.
Lamps and burners . .	Osrams	Bray, Kern, Mallol, or "Intense" Inverted
Efficiency	1·5 watts per candle	20 candles per c.f.
Cost per 1000 candle-hours for energy . .	1·5 × 1000 = 1500 watts 1·5 units at 6d. = 9d.	$\frac{1000}{20}$ = 50 cubic feet 50 c.f. at 5s. per 1000 c.f. = 3d.
Cost per 1000 candle-hours for maintenance	One 30-c.p. Osram at 2s. 6d. = 1d.	2 mantles at 4½d. = ¼d.
Total cost per 1000 candle-hours . . .	= 10d.	= 3¼

We should like the figures in the last column converted to the price of gas now existing in Bournemouth—viz., 2s. 9d. per 1000 cubic feet. If this were done, the total cost for gas per 1000 candle-hours would be brought down to a fraction under 2d.—thus showing a still greater advantage over electricity. We are glad to see pharmacists taking an interest in this practical business question of the relative cost of lighting their premises by the competing illuminants. There is an excellent margin on the figures quoted by Mr. Gardner in favour of the cost of gas lighting; and to this margin should be added the assurance of reliability that gas gives in the business premises of the pharmacist and the shops of the ordinary tradesman. There has been much disturbance of trade in the past, and consequently loss to business men, through the collapse of the supply of electricity putting their premises in darkness.

A cast-iron pipe-line 10,760 feet long and 6 inches in diameter was laid by nine men in 39 working hours in an emergency a short time since at St. Albans (Vt.). Only part of the line is under ground. No breaks or blown joints were found, though the line was tested to a pressure of 368 lbs. per square inch immediately after laying.

THE CALORIFIC POWER OF LONDON GAS.

THE acceptance by the Gaslight and Coke Company of a standard calorific power for the gas supplied by them in connection with the Bill now before Parliament, gives additional significance to the results of the "information" testings of calorific power which have been carried out in the gas-testing places of the Metropolis for the last three years. Some particulars of these results for the first six weeks of each year were given in the "JOURNAL" for March 9 (p. 687) on the eve of the settlement of terms between the London County Council and the Company for the acceptance by the latter of a standard calorific power, and of "penalty" testings for the same. Now that the terms agreed upon have become known through the proceedings in Committee of the House of Commons, as reported in last week's "JOURNAL," it will be appropriate to resume the summary of the results of the testings for previous years at the point at which it was broken off in the article in our issue of the 9th ult.

The figures there given refer to the six weeks ending Feb. 8, 1908; and the six weeks ending Feb. 6, 1909. The London County Council returns of gas testings for the next subsequent seven weeks of 1909 are now all to hand; and the following table gives the average for, and the maximum and minimum of, figures obtained during the seven weeks in question of the two years.*

TABLE I.—*Testings of Calorific Power (Calories per Cubic Foot).*

—	1908—Net.		
	Aver.	Max.	Min.
Gaslight and Coke Company	131·8	140·1	121·1
South Metropolitan Company	133·2	138·7	125·8
Commercial Company	127·24	133·3	117·7

—	1909—Gross.			1909—Net.		
	Aver.	Max.	Min.	Aver.	Max.	Min.
Gaslight and Coke Co. . .	145·8	154·7	138·5	130·0	138·8	123·6
South Metropolitan Co. .	150·2	155·4	134·3	132·8	139·6	125·6
Commercial Co.	141·64	148·9	136·2	126·19	132·4	120·4

On comparing the figures in this table with those already given for the six weeks next before the periods in question, as given in the "JOURNAL" of the 9th ult., it will be seen that the average net calorific power in 1908 was in the second half of the quarter practically the same as in the first. In regard to the gas supplied by the South Metropolitan Company and by the Commercial Company, the same remark holds good also for the first and second halves of the quarter in the present year. The Gaslight and Coke Company, however, have during the last seven weeks supplied gas averaging nearly 1½ calories per cubic foot below that supplied in the first six weeks of the year. This slight falling off in calorific power is curiously enough accompanied by a rise from 16·63 to 16·81 candles in the average illuminating power of the gas as tested by the standard "Metropolitan" argand burner, and by a somewhat smaller rise in the illuminating power in the flat-flame burner. Incidentally it may be remarked also, that the gas supplied by the Commercial Company has shown an almost precisely similar rise in its illuminating power in the standard argand burner, as compared with the average for the first six weeks of the quarter, though in the case of this Company there is no perceptible change in the calorific power. The gas supplied by the South Metropolitan Company (the average gross calorific power of which is identical in the two halves of the quarter) curiously enough showed a fall from 16·40 to 16·34 candles in the average illuminating power in the standard argand burner, and from 10·93 to 10·64 candles in the flat-flame burner.

The one point which stands out prominently in a survey of these and similar figures for testings of illuminating power and calorific power is the erratic character of the results obtained with the flat-flame burner. After three years' experience of these testings for the purpose of "information," the question seems ripe for consideration whether any good purpose will be served by a continuance of them. The information they have afforded has tended only to demonstrate that the results of such testings are so erratic as to be inherently untrustworthy, and to be of no public utility.

It will now be useful to give a comparative statement [see Table II.] of the average results of the testings of illuminating power and calorific power for the first thirteen weeks, or first quarter, of 1907, 1908, and 1909.

The outstanding feature of the averages recorded in this table is the consistent uniformity of the quality of the gas supplied by the three Companies in the same quarters of the three years. But for the apparent depreciation of the flat-flame value of the gas supplied by the South Metropolitan Company in 1908 and 1909 as compared with 1907, when a different flat-flame testing-burner was in use, and the tendency of the Commercial Gas Company to reduce the illuminating power of its supply to one more nearly in consonance with its statutory standard of 14 candles, it might be said broadly that there has been no change in any respect in the quality of the gas supplied. It has been pointed out, in a former article, that the present flat-flame testing burner appears to be less suited for developing the full lighting value of the gas than that which was prescribed for the testings in 1907; and it is now clear also that the flat-flame testings generally give somewhat erratic results. Consequently, practically no significance need be attached to the falling off in the flat-flame values. In regard to the relation between the standard argand illuminating power of the gas and the net calorific power, which, in view of the standard of calorific power which the Gaslight and Coke Company have considered it expedient to accept, is of special interest at the present time, it may be noted that with a mixed gas supply such as that afforded by the Commercial Gas Company, if the illuminating power of the gas were in fact 14 candles instead of nearly 15, the net calorific power would certainly be below the standard of 125 calories per cubic foot which the Gaslight and Coke Company have accepted. On the other hand, it may be inferred from the following statement of the minimum results of testings of illuminating power and calorific power in the first quarters of the three years, that there is not much likelihood of the calorific power falling below the value of 112½ calories per cubic foot, which is the limit above which the Gaslight and Coke Company must maintain the value of their gas to avoid the risk of incurring a penalty.

TABLE II.—*Average Results of Testings.*

FIRST QUARTER, 1907.

—	Illuminating Power.		Net Calorific Power.
	Argand.	Flat-Flame.	
	Candles.	Candles.	Calories per Cubic Foot.
Gaslight and Coke Company	16·7	11·8	133·7
South Metropolitan Company	16·2	11·13	134·4
Commercial Company	15·25	9·35	127·35

FIRST QUARTER, 1908.

—	Illuminating Power.		Net Calorific Power.
	Argand.	Flat-Flame.	
Gas Light and Coke Company	16·77	11·99	132·1
South Metropolitan Company	16·24	10·81	133·0
Commercial Company	15·048	9·074	127·35

FIRST QUARTER, 1909.

—	Illuminating Power.		Net Calorific Power.
	Argand.	Flat-Flame.	
Gaslight and Coke Company	16·73	11·77	130·6
South Metropolitan Company	16·37	10·77	133·1
Commercial Company	14·816	9·018	126·07

TABLE III.—*Minimum Results of Testings.*

FIRST QUARTER, 1907.

—	Illuminating Power, Argand.	Net Calorific Power.
	Candles.	Calories per Cubic Foot.
Gaslight and Coke Company	15·6	119·3
South Metropolitan Company . . .	14·3	122·8
Commercial Company	14·1	118·5

FIRST QUARTER, 1908.

—	Illuminating Power, Argand.	Net Calorific Power.
Gaslight and Coke Company	15·79	121·1
South Metropolitan Company . . .	14·06	125·4
Commercial Company	13·90	117·7

FIRST QUARTER, 1909.

—	Illuminating Power, Argand.	Net Calorific Power.
Gaslight and Coke Company	15·61	122·7
South Metropolitan Company . . .	14·50	122·3
Commercial Company	13·07	119·2

Having regard also to the fact that the gas may on a single testing fall slightly below 112½ calories net per cubic foot (provided the average of three days' testings is above that figure, without a penalty being incurred), it would seem that the Gaslight and Coke Company should be able, in all ordinary conditions of working, to escape that indignity. There is, however, the catch penalty limiting-value of 106½ calories per cubic foot, which must not be underpassed in any single day's testings if a forfeiture is to be avoided. As suggested in our editorial columns last week (p. 13), in conceivable circumstances of manufacture and supply this catch penalty testing may prove a real burden to the Company's Engineers, and can scarcely be held to afford any further real protection to consumers than the general provision that the average of any three consecutive days' testing must not fall below 112½ calories.

There are some other points in connection with the summaries of the results of testings made in the testing-places under the control of the London County Council to which we propose to revert in a subsequent article.

* The precise periods are seven weeks ending March 28, 1908, and seven weeks ending March 27, 1909.

NOTES FROM WESTMINSTER.

"I OBJECT," said Mr. William Thorne when the Gaslight and Coke Bill was introduced for third reading in the House of Commons on Wednesday night; and thereupon further consideration of the measure was formally postponed to the 20th inst., after the recess. Mr. Thorne only represents the views of the labour members of the West Ham Town Council, who oppose the amalgamation of the West Ham Company to the Gaslight and Coke Company solely on one ground, treating all other considerations as relatively of small moment. We anticipate, in view of what has taken place before the Select Committee, that the House will not agree with Mr. Thorne and those he represents.

Water Bills. On Monday and Tuesday of last week, there was almost desolation in the Committee rooms, and absolutely so on Wednesday. The water section of the Oldham Bill has been drawn out to a length that has become somewhat wearisome; and it was still on when Section A of the Local Legislation Committee thankfully adjourned their deliberations to April 20. The Llanelly Bill is the only water measure (in addition to those noticed last week) upon which there was pronouncement. As mentioned in the "Notes" a week ago, this Bill—the promotion of the District Council—has been considered by Mr. Rose's Committee. There was discussion on Monday of the objections of the Crawshay Bailey Trustees and the Burry Port Council. The Trustees were averse to the compulsory taking of a strip of land from their property for the purpose of preventing pollution from a farm; their objection being on account of the mineral value of the land. The sensible alternative was suggested by them that the source of pollution should be removed without compulsory acquisition. As to the Burry Port District Council, they did not want the Llanelly Council supplying in their area. Last year Burry Port joined hands with the Llanelly Rural District Council in promoting a Bill for obtaining a supply of water; but the scheme was rejected. The Burry Port Council have lately had a pumping scheme in prospect of their own, at a cost of £14,000. Of course, they could not see any economic advantage in allowing another authority to supply them. These small authorities very rarely can, owing to jealousy of their own dominant authority. But up to now, Burry Port has no drainage, gas, or water system; so that the local governors have not been active. The upshot of the discussion before the Committee was that the Llanelly Council have got their Bill for extension of limits, the construction of a large scheme of filtration plant, and other purposes. But there is to be the insertion of a purchase clause similar to the model one in favour of the Llanelly Rural District Council, but applying only to distribution plant in their area, on the condition that seven years is the limit for the introduction of a Bill for the purpose. The clause is to be approved by the Speaker's Counsel (Mr. Ernest Moon, K.C.) after Easter; and, by the way, Mr. Rose expressed the views of the Committee that the model clause is by no means a model clause. The curious manner of statement is effective. Another condition is that the promoters are to introduce a clause satisfactory to the Committee dealing with the water pumped from mines that may be sunk in the gathering area, to give protection to the dormant interests of the mineral owners.

THE FUTURE OF TAR AND THE MANUFACTURE OF COMPRESSED FUEL.

[COMMUNICATED.]

To those interested in gas undertakings who have given any consideration to the subject, the present position and the apparent prospects of the tar market must induce a feeling of grave concern. True, there is a brightening just now; but there can hardly be a man optimistic enough to believe it is more than momentary, or that it will gradually lead to such a resuscitation of prices as was experienced five years back. The present position is not due to causes that can easily be removed. Over-production is at the root of the slump in prices; and any remedy must be in the way of providing a ready means of absorbing the excess at not less than the same ratio of increase. How far values have dropped can be readily gauged from the following table of prices ruling at the beginning of each of the last fifteen years, according to the quotations given in the market reports of the "JOURNAL."

Year.	Range of Prices.	Mean.
1895	18s. od. to 22s. od.	£1 os. od.
1896	18 0 „ 24 0	1 1 0
1897	17 6 „ 23 6	1 0 6
1898	13 0 „ 17 6	0 15 3
1899	14 0 „ 19 6	0 16 9
1900	16 6 „ 25 6	1 1 0
1901	14 0 „ 18 0	0 16 0
1902	15 0 „ 18 0	0 16 6
1903	21 6 „ 26 6	1 4 0
1904	22 6 „ 27 0	1 4 9
1905	18 0 „ 22 0	1 0 0
1906	18 0 „ 22 0	1 0 0
1907	14 0 „ 18 0	0 16 0
1908	13 6 „ 17 6	0 15 6
1909	10 9 „ 14 9	0 12 9

In all this period, there has not hitherto been such a long-continued slump as we have experienced the last four years. The mean price has gone down no less than 7s. 3d. per ton, or at the rate of more than 36 per cent. The greatest previous slump was much more rapid; for within twelve months from January, 1897, to January, 1898, the mean price dropped 5s. 3d. per ton, or about 25 per cent. Even this, however, left the price half-a-crown higher than it was at the commencement of the present year. Be it noted that the depreciation in value of recent years synchronizes with the development of bye-product recovery works in connection with colliery coking plants.

It has been fashionable of late to anticipate a substantial increase in prices through the expanding demand for tar products in the construction of roads or the protection of road surfaces. But the optimism that developed out of the cry for a mitigation of the dust nuisance consequent on motor traffic, must surely by this time have faded away. It is a trite saying that "every little helps;" and in this connection the use of tar for roads must be viewed as a "little." Local authorities are seldom pioneers. This being so, the development of the use of tar on the highways is unlikely to proceed rapidly, and certainly not at such a rate as to absorb the increased quantity of tar produced.

Let us examine the matter in the light of tar production. The last Board of Trade returns (for the year 1906 for authorized companies and the year 1906-7 for authorized local authority undertakings) showed that 14,846,257 tons of coal were used for gas making in the United Kingdom. Unauthorized undertakings would doubtless bring this figure up to 16 million tons. Though the quantity of carburetted water gas made during the above-named period was about 11 per cent. of the total, the tar produced in its manufacture may be ignored, as the quantity is comparatively trifling, and it is used to a considerable extent as fuel for steam raising. Taking the production of tar on the basis of one ton for every 18 tons of coal, we have an annual production of about 888,000 tons. The trend of carbonizing practice is to gradually increase the yield of gas and lessen that of tar per ton of coal; so that though the quantity of coal carbonized may increase, it is more than likely that for a number of years the production of tar will not materially exceed this figure. If there were no outside influences, therefore, the prospect of a continuously hardening market would be roseate.

The "fly in the ointment" is the bye-product coking-oven. In his paper read in 1907 before the Institution of Gas Engineers,* Mr. Ernest Bury gave 3,317,000 as the minimum estimated quantity of coal carbonized in these ovens in the year 1905; so that it is safe to say that the annual quantity is now not less than 4 million tons, or 25 per cent. of the quantity carbonized in all the gas-works in the kingdom. As bye-product ovens yield tar at the rate of 4·5 per cent. of the coal carbonized, the tar placed on the market from this source is 180,000 tons. But there is a more gloomy fact. Mr. Bury calculated that 16 million tons of coal were carbonized in beehive and non-recovery ovens of other types; and he gave good reasons for believing that these afforded an enormous field for the extension of bye-product recovery plants, apart altogether from the ordinary development of the process of coking. As a matter of fact, though these figures were presented less than two years ago, there has already been a substantial supplanting of non-recovery ovens by those of the recovery type; and this will probably go on till the wasteful ovens entirely disappear. There is, therefore, in contemplation from this source a further production of 720,000 tons of tar, which, however, will be a gradual process extending over a number of years. The effect, too, which will be produced by any increase in coking at the collieries will obviously be to further increase the supplies of tar. The time when more tar will be produced at bye-product works than at gas-works may, indeed, be not very far distant.

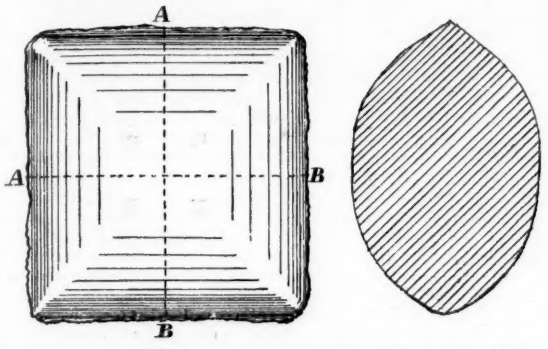
Having regard to the foregoing facts, the possibility of an appreciable advance in prices would appear to depend upon how far new outlets for tar products can be opened out. Of these pitch is the chief determining factor. It is a singular fact that, though pitch is exported in large quantities for the purpose of briquette manufacture on the Continent, very little has yet been done in this direction in the United Kingdom. The cheapness of other fuels is, no doubt, chiefly responsible for this; but the present price of pitch considerably alters the financial aspect of the process. At the present time there are in South Wales about half-a-dozen firms who manufacture briquettes, and the total daily capacity of the plants at work will be approximately 2500 tons. Small coal, with a certain proportion of anthracite "duff," is mixed with pitch in the proportion of 9 to 1. The briquettes are nearly all sold for marine fuel in this and other countries—a considerable percentage being exported to Italy. Other large installations are about to be put down in the same district, which indicates that there is a growing demand for such fuel for the purposes named. It is doubtful whether there are more than half-a-dozen other installations in all the rest of the kingdom; and where they exist, export trade largely commands the produce. Is it not possible to cultivate a demand for compressed fuel in this country?

In his book on "The Design, Construction, and Equipment of the Granton Gas-Works," Mr. Herring describes briefly the coke-dust briquette plant which has been installed there. The plant is capable of turning out briquettes at the rate of 40 tons in a nine-hour day. Taking the cost of breeze at 2s. 6d. per ton in each case, the cost of manufacture worked out at 9s. 0½d. per ton with pitch at 52s. 6d. per ton, and at 6s. 8½d. with pitch at 31s. 6d.

* See "JOURNAL," Vol. XCVIII., p. 982.

The briquettes consisted of a mixture of nine parts by weight of breeze to one part of pitch. Taking the current price of pitch at 21s. 6d., the cost would now work out at 5s. 8½d. per ton. Though only a few thousand tons of briquettes were made altogether, some of these were shipped as far as Egypt. We are told that, from a practical point of view, the plant was quite a success, but that one disadvantage was the high percentage of ash in the residue; Scotch coal containing much more ash than average English coal. No figures as to the cost of the plant are given; but the price of production based upon current values of pitch is so phenomenally low that, so far as English works are concerned, it seems to be a matter well worth going into.

One great objection to briquettes, from the aspect of domestic use, is that they require breaking. Machines are now designed, however, to produce a compressed fuel of smaller dimensions. These are termed "eggettes," and the accompanying diagram shows a plan and section of one lump of such fuel, the weight of which is slightly less than 4 oz.



Plan. Section on Line A B.

It is claimed by one of the largest makers of plant for manufacturing compressed fuel that the fuel fetches the same price as is obtainable for "best" coal, and that consumers seem to prefer it on account of it being cleaner, more durable, producing less smoke, and capability of being stacked out of doors without suffering injury from the weather. We are also told that colliery owners realize how profitably their otherwise unsaleable small coal can be utilized and disposed of. If this is so, is it not possible for the process to be commercially successful when applied to the incorporation of coke breeze and pitch in the form of "eggettes?" The satisfactory application of such a process would secure many advantages. It would raise the price of pitch, the chief residual of tar; it would improve the receipts from coke, for, on the Edinburgh basis of 2s. 6d. per ton for breeze, it would secure a better return than is at present obtainable for coke breeze in many large works; and it would give the public the choice of another almost entirely smokeless fuel. One of the most crucial points seems to be the percentage of ash which the coke breeze contains, as, if this is large, a "dirty" fire will be produced. This objection, however, applies with little greater force to compressed fuel produced from coke breeze than to ordinary gas coke. If the objection is fatal in the one case, why not in the other?

The essential parts of a briquette plant are: A pitch cracker for breaking up the pitch; a mixer or measurer for mixing the coal or coke breeze and pitch in the proper proportions; a disintegrator for pulverizing the mixture; a superheater for superheating steam; a heater for producing the proper amalgamation of the mixture; a briquette or compressing machine; and the necessary elevators, conveyors, shafting, steam-raising and power plant. Machines can be obtained that exert a pressure of 2 tons per square inch. Unfortunately, the size of the plants obtainable is such as to limit their prospect of financial success to medium and large-sized gas-works. Four sizes are offered in the catalogue of one maker; the productive capacity per day of ten hours being 25, 50, 100, and 200 tons respectively. The smallest, therefore, is capable of turning out no less than 7500 tons of compressed fuel per year of 300 working days. There is available a smaller plant, of 10 tons per ten-hour day capacity; but the compression is not so great. Even this, however, is equal to an output of 3000 tons per annum; and assuming a works produced 10 per cent. of coke breeze, it would take a gas-works carbonizing 54,000 tons of coal per annum to keep it fully employed. At nearly all gas-works coke breeze is used for raising steam; and therefore even the 10-ton plant would probably meet the full requirements of works carbonizing not less than 80,000 tons of coal per annum.

In his recent paper before the Manchester District Institution, on "The Make and Sale of Coke," Mr. Watson, of Doncaster, showed that, after making due allowances for the quantity absorbed by the manufacture of carburetted water gas, the gas industry of the United Kingdom has approximately 7 million tons of coke to dispose of every year. Assuming that the handling of this quantity of coke resulted in a surplus of breeze, after providing for steam-raising purposes, of 5 per cent., the quantity would be 350,000 tons. To manufacture this into "eggettes" would require close upon 40,000 tons of pitch, or what is yielded by 66,000 tons of tar. Clearly, then, if the whole of the surplus breeze in gas-works were made up into compressed fuel, it would not of itself permanently relieve the situation. The introduction and proved success of such a process, however, would indirectly accomplish a good deal. It would demonstrate that the commercial success of such a venture by gas undertakings could be emulated with confidence by the owners of collieries with coking plants, where similarly a large percentage of breeze is made. In short, the manufacture of "eggettes," both by gas undertakings and collieries, would absorb such a large quantity of pitch as to materially improve the prospects of tar for all time.

It may be contended that the general adoption of the manufacture of compressed fuel would, by absorbing such a large quantity of pitch, so improve the market price of the latter as to make it no longer remunerative to work the plants. Once the market for such fuel had been created, however, the price would be fixed according to any such altered conditions. The price of pitch being up, the price of "eggettes" would go up also. For a time, possibly, any such advance would produce a decreasing demand, which would lessen the "draught" on pitch, and so each would continue to react upon the other. This assumes that all other factors would remain the same. In any event, such a contingency may, in the present despondent condition of affairs, be viewed with equanimity. An advance of £1 in the market price of pitch, too, would only add 2s. per ton to the raw material costs of the "eggettes," which is less than the fluctuations experienced every year in the price of house coal.

Compared with the size of the works, the cost of an installation for producing compressed fuel cannot be regarded as great. Inclusive of engine and boiler, the following have been given to the writer as the approximate costs: For a daily capacity of 25 tons, £1100; 50 tons, £1750; 100 tons, £2425; 200 tons, £4500. It has already been observed that the plants at present available are obviously too large for small works. If the largest works, however, succeeded in making such a manufacturing departure a commercial success, ingenuity in the way of producing practicable smaller plants would probably be quickly forthcoming. The cost of briquetting as given to the writer (when 100 tons are made per day) is about 8d. per ton for labour, to which have to be added the establishment charges and the cost of the raw materials.

This matter seems one that may well receive attention from engineers in charge of the largest works. For anything the writer knows, it may in many cases have received such attention already. But beyond the Granton experience there does not appear to be any published information on the subject. If the process on a large scale has been found impracticable, it would save a good deal of optimistic speculation if the actual results were forthcoming. The utilization of tar as a fuel under gas-retorts has frequently been advocated as a means of avoiding a glut of supplies. With the evolution of the bye-product recovery plant, however, a new factor has become established; while the economy of modern regenerative settings does not lend encouragement to the substitution of tar for coke as the fuel for carbonizing.

The subject of tar disposal is one which, in all its aspects, may well merit general attention. It is true that many undertakings dispose of their tar to private firms for distillation; but this does not lessen the financial interest which the gas industry has in the prices obtainable for the various residuals produced in connection with it, and in the creation of new outlets for them.

Corrosion of Steel Reinforcement in Concrete.

At the Meeting of the Society of Engineers on Monday last week, Mr. Ernest R. Matthews, Assoc.M.Inst.C.E., the Borough Engineer of Bridlington, read a paper on the above subject, in which he explained in detail various tests he had carried out in connection with the rusting of steel in concrete. The conclusions arrived at may be briefly stated as follows: Rusty steel embedded in concrete will in a very short time become bright, regardless of whether the concrete is in water or air. (This point, in the author's opinion, was conclusively proved by his experiments.) That the application of cement grout to steel is an effectual safeguard against corrosion, but that the greatest care should be taken in the grouting process to see that every portion of the steel is well coated, and that before the steel is embedded in the concrete the cement grout is allowed to dry upon the steel. That if the aggregate used for the concrete is not porous and the concrete is well mixed, the reinforcement being well embedded, no cement coating is needed. This also was proved by experiment. That no porous materials, such as coke breeze or slag, should be used in connection with reinforced concrete work if such concrete is intended to be under water or exposed to the air. That linseed oil or turps, or probably any other coating except cement or lime, applied to steel before its insertion in concrete, facilitates rather than prevents the rusting of the metal. That it is of great importance to ensure that the reinforcing steel is well embedded in the concrete, so that every portion of it is covered with cement. That the best results were obtained when the aggregate consisted chiefly of broken stone or brickbats; though gravel would no doubt answer equally well.

Mr. Samuel Lee Rymer, J.P., of Croydon, the Deputy-Chairman of the Worthing Gas Company and a Director of the Bournemouth Gas and Water Company, left £25,976.

THE CONDITIONS FAVOURABLE TO THE PRODUCTION OF METHANE.

By Thomas Holgate, M.Inst.C.E., F.C.S.

(*Concluded from* p. 28.)

From what has already been said, it will appear that our inquiry is directed towards answering the following problem: How is it that, despite the fact that hydrocarbons—the most valuable constituents of coal gas—are decomposed by the temperatures prevailing in horizontal, inclined, or vertical retorts, yet the best results calorifically—and often illuminating—per ton of coal are coincident with the higher temperatures worked.

If we may judge by a comparison of the three tests made at Nottingham upon the same coal at red heat up to bright orange heat, the total gain in calorific value of 1,388.700 B.Th.U. was nearly all provided by increased quantities of carbon monoxide and hydrogen. The gain in the former was 132 per cent.; in the latter, 83 per cent.; while the C_nH_m were stationary, and the methane almost so—the gain being only 4·6. Of course, some of the carbon monoxide and hydrogen may have come from the water-gas reaction; but this would have given an increase of equal volumes. The actual gains were more nearly 3 of hydrogen to 1 of carbon monoxide, agreeing with the equation given on p. 28. The ratio of H : CO in the Nottingham tests is quite different to that for Dessau, and to that for Nine Elms—being about 3·7 for the first-named, and 10·1 and 6·1 respectively for the latter.

These striking contrasts cannot be without significance, and they suggest the question as to whether, if the aforesaid explanation have some degree of validity for the Nottingham tests, then that Dessau, with its low carbon monoxide and high hydrogen contents, may be accounted for by the decomposition of methane into twice its volume of hydrogen, with the deposition of carbon improving the commercial value of the coke. Perhaps this is not an unsupported explanation; for Messrs. Bone and Coward, in their recent Chemical Society paper, show that surface of contact promotes the decomposition of methane into its elements more quickly than rise of temperature in an unpacked tube. The Nine Elms figures are notable in their high content of methane and low value for C_nH_m; the two giving a satisfactory total. The ratio of hydrogen to carbon monoxide is intermediate to those of Nottingham and Dessau. The rise in hydrogen and carbon monoxide in the three tests at Nottingham is notable; but when we examine the figures relating the analyses of gas taken at successive intervals in the same distillation of another example, we do not find so marked a difference. So that it would be an advantage if this progression with elevation of temperature could be closely watched experimentally, and its favourable conditions defined.

The change from methane into carbon monoxide and hydrogen would require an absorption of heat which would be again available on the combustion of the new gases, showing a gain of 28 per cent. Thus $CH_4 + H_2O = 3H_2 + CO$. A cubic foot of methane, yielding 1070 B.Th.U., would be replaced by 3 cubic feet of hydrogen, each yielding 344 B.Th.U. and a cubic foot of carbon monoxide yielding 342 B.Th.U.—a total of 1374, or a gain of 304, equal to 28 per cent. Such an explanation appears to provisionally answer the thermal aspect of the question.

Usually carbon monoxide is regarded as a non-illuminant; but in the tests referred to, Mr. L. T. Wright found that there was a ratio between the luminosity ascertained and the total carbon vapour, which included carbon present as monoxide. Seeing that in the last of the series [line 4] there was a considerable proportion of the carbon present in that form, it seems desirable to ascertain whether such a fact was anything more than a mere coincidence. It has been claimed that, in developing luminosity—more especially in carburetted water gas—carbon monoxide had advantages that remained unexplained. Seeing, however, that methane is intimately affected by the presence of suitable ratios of carbon monoxide and hydrogen in a flame, it is not impossible that a clue to the unexplained may be found in the known luminosity of methane.

Mr. L. T. Wright's tests appear to corroborate his view; but the confirmation is not so unequivocal when we apply the rule to the samples of gas from vertical retorts. Further, while it is true that in the four Nottingham tests, the average value of carbon vapour was nearly the same, yet it can be shown that this average was compounded of three different values for (*a*) unsaturated hydrocarbons, (*b*) methane, (*c*) carbon monoxide. The details for three of these tests give 7 candles per hour per cubic foot of carbon vapour in the unsaturated hydrocarbons, 5·33 candles in methane, and 4·525 candles in carbon monoxide. As these empirical values are derived solely by computation, the figures that show their concordance with the observed illuminating values are set forth in Table VIII.

There is some uncertainty attaching to (*) for Dessau and Nine Elms, owing to the absence of carbon density in the analyses. They have been calculated as below, in Table VIII., from the calorific values observed in the respective tests. It is, of course, possible that carbon monoxide may influence luminosity, and be itself affected by other factors; and it would be unreasonable to expect samples of gases made in diverse modes to yield figures identical with the average that Mr. Wright found—viz., 5·575 candles per cubic foot of total carbon vapour. One reason in his case for the uniformity would be that the heating power of the unsaturated hydrocarbons in each member of the series of tests was almost exactly the same (as shown by Table VI., Column 10). The carbon volumes of the same series of gases (see Column 3, Table VIII.), was not, however, quite so uniform, though still not very divergent. Submitting the analyses of gas from vertical retorts to the same rule, we see at once the difference in the composition and the difference in the total candles

Table VI.

Origin of Data.	Per Cent. of Total Combustibles.				Ratio of Hydrogen to Carbon Monoxide by Volume.	Calorific Value (Gross) per Ton of Coal Carbonized in Thousands of B.Th.U.				
	CO.	H_2	CH_4	C_nH_m.		Due to CO.	Due to H_2.	Due to CH_4.	Due to C_nH_m.	Total.
Nottingham, *a*	8·98	39·24	44·00	7·78	4·3	246·0	1080·9	3771·1	1248·0	6346·2
,, *b*	12·94	45·30	35·72	6·04	3·5	414·4	1459·4	3578·2	1209·5	6661·5
,, *d*	14·26	49·41	31·59	4·64	3·4	573·2	1983·2	3943·8	1234·6	7734·9
d—*a*	+ 5·28	+ 10·17	− 12·41	− 3·14	—	+ 327·2	+ 902·3	+ 172·7	− 13·4	+ 1388·7
Dessau, vertical	5·87	59·85	31·25	3·03	10·1	216·8	2224·0	3612·3	746·2	6799·3
Nine Elms ,,	8·13	50·28	38·44	3·15	6·1	314·8	1959·4	4659·0	478·3	7411·5

Table VII.

Cubic Feet of Gas Per Ton.	Volumes of Carbon Vapour Per 100 Cubic Feet of Gas.				Illuminating Power in Candles.		Origin of Data.
	CH_4.	C_nH_m.	CO.	Total.	Per 5 Cubic Feet of Gas.	Per Cubic Foot of Carbon Vapour.	
8,250	42·72	20·61	8·72	72·05	20·5	5·69	Nottingham horizontals *a*
9,693	34·50	16·96	12·50	63·96	17·8	5·57	,, ,, *b*
10,821	..	..	..	60·66	16·7	5·51	,, ,, *c*
12,006	30·70	11·81	13·96	56·47	15·6	5·53	,, ,, *d*
11,259	29·985	8·709	5·63	44·324	16·453	7·424	Dessau verticals, non-steaming
12,423	35·05	4·32	7·41	46·78	15·82	6·763	Nine Elms verticals

Table VIII.

Origin of Data.	Volumes of Carbon Vapour per Ton of Coal.					Illuminating Power in Candles.		Candles per Ton, Calculated, Due to					
	Due to CH_4	Due to C_nH_m.	Due to Hydro-carbons.	Due to CO.	Total.	Per Ton.	Per Cubic Foot of Carbon Vapour.	CH_4.	C_nH_m.	Hydro-carbons.	CO.	Total.	Difference from Observed.
Nottingham, *a*	3524	1700	5224	719	5944	33,950	5·69	18,800	11,900	30,700	3255	33,955	+ 5
,, *b*	3344	1644	4988	1212	6200	34,510	5·57	17,835	11,507	29,342	5482	34,824	+ 314
,, *d*	3686	1418	5104	1676	6780	37,460	5·53	19,657	9,925	29,582	7584	37,166	− 294
Dessau	3376	980*	4356	634	4990	37,049	7·42	18,005	6,864	24,869	2868	27,737	− 9312
Nine Elms	4354	537*	4891	920	5811	39,306	6·76	23,223	3,757	26,980	4165	31,145	− 8161

obtained from smaller volumes of carbon vapour, and notably of that assigned to C_nH_m (Column 10, Table VIII.). The observed values for Dessau and Nine Elms exceed those computed on the same bases as the other three by 9312 and 8161 candles, or 33 and 26 per cent. respectively (see Column 14). A good share of this difference must be due to the testing of the later samples in the No. 2 burner. The wide difference between the calorific values of the unsaturated hydrocarbons from Dessau and Nine Elms retorts must correspond to a difference in carbon density, and hence to a difference in the carbon volumes in the most desirable combination. But, allowing for all these considerations, it appears that we can scarcely calculate the illuminating values to be in accord with the observed values without attributing some lighting value, of an indirect character, to carbon monoxide. From Table VI., we saw the ratio of hydrogen to carbon monoxide as being greatest for Dessau, much lower for Nine Elms, and still less for Nottingham—figures which suggest some connection with the abnormality as to the illuminating values just discussed.

The writer has already said that he knows of no experiments upon the luminous effect of carbon monoxide in argand or flat flames; but he is aware of some in connection with bunsen flames for incandescent lighting that have some bearing upon the subject. Baur, for instance, explains the intense green light which the inner cone of the bunsen burner sends out when the primary air supply is large by the hypothesis that, under these conditions, methane is present in the brightly radiating layer. Professor Haber states that in such a case the unburnt gas-air mixture contains 7 per cent. of methane which is not present in the burnt mixture; but, after a theoretical investigation, he gives the opinion that any methane found in the flame must represent simply traces of the original substance which have escaped oxidation and decomposition in the inner cone.

The following outline of this theoretical investigation does not, however, in the writer's opinion, negative the possibility of interaction between the constituent gases in a luminous flame.

$$C + CO_2 \rightleftharpoons 2CO \qquad C + 2H_2 \rightleftharpoons CH_4$$

By combining the carbon dioxide equilibrium with the methane equilibrium (see *ante*), we obtain the following: $2CO + 2H_2 \rightleftharpoons CH_4 + CO_2$, which distinctly is germane to the question here discussed. The carbon dioxide equilibrium has been carefully studied by Mayer and Jacoby; and using the values obtained below 750°, the following expression is derived:—

$$15{\cdot}8 - \frac{37{,}936}{T} + 3{\cdot}54 \log_e T - 0{\cdot}003136\,T = R \log_e \frac{p^2CO}{pCO_2}.$$ Subtracting from this the methane equilibrium given earlier in this article, we obtain:

$$-5{\cdot}3 - \frac{19{,}429}{T} + 9{\cdot}5334 \log_e T - 0{\cdot}0002\,T = R \log_e \frac{p^2CO \times p^2H_2}{pCO_2 \times pCH_4}.$$

Professor Haber regards this thermodynamic relation as showing that in hot water gas containing a few per cents of CO_2, CO, and H_2 no perceptible amount of methane (CH_4) can exist in equilibrium, even at a red heat. But (he goes on to say) the fact that traces of methane do nevertheless persist above the inner cone is evidence of the extraordinary slowness with which methane reacts at high temperatures. This reasoning as to the possibility of the existence of methane, apparently applies where there are a few per cents of CO_2, CO, and H_2, such as the bunsen flame amply supplied with oxygen and nitrogen, but would doubtless lead to a different conclusion where the per cents of CO_2, CO, and H_2 are much larger, such as in the luminous flame of the standard argand. Professors Bone and Lowey have recently uttered cautions against accepting the conclusions of thermodynamic reasoning, without putting them to the touchstone of experiment. The case we are now considering appears to be one for such a suspension of judgment, seeing that the presence of methane above the inner cone of a bunsen burner has quite recently been confirmed by Mr. B. S. Lacy. Certainly, from the figures given in this article, we are under the necessity of accounting for some luminosity in an argand, emanating from carbon in the form of monoxide. Professor Haber's conjectural explanation of the presence of the methane may not necessarily be correct; and we have the alternative of the interaction of hydrogen and carbon monoxide, as mentioned above. If this latter view be legitimate, then it is reasonable to accept Mr. L. T. Wright's rule as being one that is in accord with the chemical and physical possibilities of the case.

The lecture of Professor Bone before the Institution of Gas Engineers (see "JOURNAL" for Aug. 4, 1908), contains much that is valuable in relation to the generation and the preservation of methane in the gas-retort; but the paper of Messrs. Bone and Coward, since published, contains more detailed information thereupon. The behaviour of methane under heat in a plain tube and in a packed tube has been compared and the results embodied in Diagrams Nos. IV and V. The results agree with those of Mayer and Altmayer on the conditions of equilibrium; but their further value resides in the fact that they show clearly the influence of time and surface in determining the rate of approach to equilibrium. The important practical lesson to be drawn from Diagram No. IV. is that, at 600° to 700° C., the quantity of methane decomposed in an unpacked tube for one hour was almost *nil*. The significance of this will be apparent when we remember that, according to the equilibrium curve in Diagram No. III., this is the temperature at which the decomposing effect of heat per degree rise of temperature is at a maximum. The explanation of the apparent contradiction probably lies in the extreme slowness with which equilibrium is reached in an unpacked tube that is favourably disposed towards this delay.

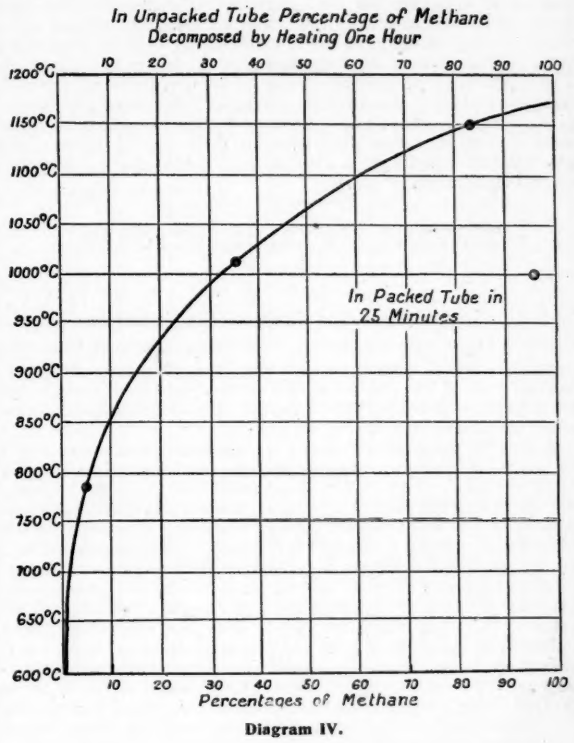


Diagram IV.

Diagram No. IV. shows that at 1000° C., using a packed tube, 96 per cent. of the methane would be decomposed in 25 minutes; but in an unpacked tube, at the same temperature, 32 per cent. only would be decomposed in an hour. $\frac{96}{25} = 3{\cdot}84$ and $\frac{32}{60} = 0{\cdot}53$ give the percentages per minute, and show the former to be 7·2 times the latter. But unpacked tubes vary; and the effect of two different ones is compared with a packed one in Diagram No. V. The large difference in the results from an unpacked tube recorded by Professor Bone in 1901 and those recorded last year, led to an inquiry by the writer, which elicited from Dr. Bone the valuable information, kindly given in a private communication, that "two different tubes have different 'surface factors,' and even with one and the same tube differences are often found, according as the tube is new or has been used for some time." If minute rugosities such as these can have such a powerful influence—vouched for, as they are, by most careful observation—it is easy to believe that methane in a retort may be greatly affected by the internal disposition in the retort of the charge of coal.

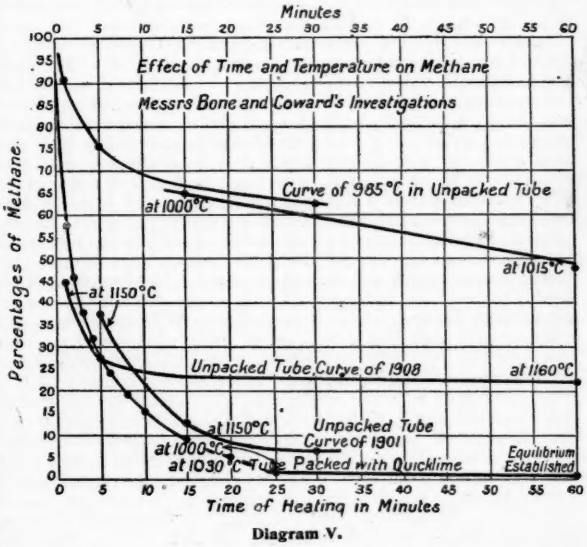


Diagram V.

Diagram No. V. shows that, although at 1030° C. decomposition of methane begins at once, yet it only reached the condition of equilibrium for that temperature after an hour's heating, when only 0·7 per cent. of methane was present, or about 1·4 per cent. of the original methane remained undecomposed. The

behaviour of methane in the unpacked tubes is given for a number of temperatures and for varied times of heating, especially for the two tubes with the different surface factors just mentioned. They are marked 1901 and 1908 respectively. It is important to note that the 1901 unpacked tube gives a curve that is nearly parallel to that of the packed tube. The curves show that the effect of temperature is modified by surface, even more than by time, though the importance of the latter is quite large. The applicability of these researches of Messrs. Bone and Coward, and Herren Mayer and Altmayer, to present-day retort problems is of the greatest value; and the writer desires to express his great indebtedness to these gentlemen for their careful work, which has enabled him to get a clearer insight into the complexities of coal distillation.

TESTINGS FOR CALORIFIC POWER.

[Communicated.]

The calorific power standard which has been introduced into the Gaslight and Coke Company's Bill has come sooner than was expected; but it cannot be said that, in the interests of the enlightenment of the public, it will be in any way an unwelcome introduction—provided that in the question of forfeitures it supersedes the illuminating power standard.

A calorific power standard of 125 calories net for a mixed supply of 14-candle power gas is undoubtedly too high. This is plain from an examination of the Commercial Gas Company's tests—the only Metropolitan Company supplying this quality of gas—published by the London County Council. From the figures reproduced in the "Journal" for March 9, it will be noticed that, during 1908, this Company supplied an average quality of 14·83-candle gas, giving calorific power tests varying (in the comparatively large range of 16·7 calories) from 119·3 to 136·0 net, with an average of 127·5; while for 1909 to date, the average has been reduced to 125·9, with tests varying from 119·2 to 132·2. It is plain from these results that, while supplying a perfectly satisfactory quality according to the (illuminating power) standard of the present time, the quality as regards the new standard accepted by the Gaslight and Coke Company must constantly have been under the prescribed limit of 125 calories. The weekly published figures from two testing-stations show that, during the twelve weeks of the current year, the average supplied during any one week was lower than 125 calories net on five occasions, while the minimum during any one week was lower than the new standard on nineteen occasions out of a possible twenty-four. In a few cases even the maximum test was only a fraction above 126.

It would at least be thought that the supply of a mixed 15-candle power gas would ensure a calorific power test up to the standard of 125 calories; but that this is by no means certain is proved by the fact that for the week ending Jan. 9 the average illuminating power at one of the Commercial Gas Company's testing stations was returned as 15·18; while the average (net) calorific power was only 123·4—the highest for the week being 126·1, and the lowest 121·2. Again in the following week, at the same testing-station, the lowest illuminating power test was 14·8; and yet a calorific power test of no more than 119·2 was reported on one occasion during that week.

These few instances are quite sufficient to show that the standard of 125 calories accepted by the Gaslight and Coke Company will be impossible to maintain regularly unless they supply a quality very slightly inferior to that which is now supplied under the 16-candle standard; and in this case the estimated saving of ½d. per 1000 cubic feet (presumably on oil) as a result of a reduction in the illuminating power by two candles must be quite problematical—at least, to outsiders.

In making a mixed gas of 14 or 15 candle power, as would be supplied by a company under a 14-candle standard with the Carpenter burner, it is necessary to dilute the coal gas (which will vary from 15 to 17 candle power), with an average of about 16 candles. If, for instance, 30 per cent. carburetted water gas is being made to mix with the coal gas, it must be of no more than 12·66-candle power to dilute the mixture to an average of 15-candle power. Should the supply of 15-candle power gas be considered too high, it is an easy matter to reduce the water gas to 11-candle power, and so supply an average mixture of 14·5 candles. This would, however, be cutting it too fine, and would not allow sufficient margin for a variation in the coal gas. With some coals, and working with high heats, the candle power of the coal gas will average little more than 15 candles; while with other coals, it will average fully 2 candles higher. Under these conditions, it is a great boon to be able to vary the water gas to maintain the quality of the district supply within wide limits. It is a well-known fact that carburetted water gas is of much lower calorific value than coal gas of equal illuminating power; it would, indeed, have to be very rich to reach the standard of 125 calories. Low-grade water gas of 12 or 13 candles gives a heating value of about 110 or 115 calories; so that it is quite clear that the proportion of gas of this quality must be restricted if the standard of 125 calories be maintained.

Further, it is the usual policy among gas undertakings supplying a mixture of coal gas and water gas to limit their reserve plant entirely to water gas. Thus a gas company supplying (say) 30 per cent. of water gas under normal conditions would probably in times of foggy or frosty weather increase their output of water gas by as much as 100 per cent.—making for the time being 46 per cent. of water gas to 54 per cent. of coal gas. Though the normal mixture might conceivably be maintained at the standard, it would be a difficult and an expensive matter to supply a 14-candle power gas of the above-mentioned mixture at the figure of 125 calories. To regularly maintain this calorific quality, a gas company would be compelled to spend on oil a sum of money which would by no means be represented by the infinitesimal gain in heating power. This waste of money would in any case, under the sliding-scale, come almost entirely out of the consumers' pockets.

While the standard of 125 is much too high, the limit of 112·5 before a penalty is incurred is reasonable; and it should not be difficult to exceed this figure on all but exceptional occasions. But the fact does not do away with the objectionable introduction of an additional penalty test at a time when gas undertakings merely need freedom to give the public the service which most closely represents their requirements. Restrictions are wholly unnecessary in these days of strenuous competition; and, besides, the sliding-scale absolutely ensures fair treatment to the consumer.

There are one or two features of a calorific power test which are not likely to commend themselves to a gas company. Firstly, the unreliable character of a calorimeter—and this fact has been conclusively demonstrated by the frequent repairs necessary to keep the Boys calorimeter in working order. For the benefit of those who have not had the opportunity of seeing the weekly reports published by the London County Council, it may be stated that on no occasion during the current year have there been less than two calorimeters out of a total of twenty-two under repair. Frequently there have been seven or eight under repair at the same time; and during one week no less than eleven (or half) were *hors de combat*. This speaks ill for an apparatus on the results of which a penalty may be incurred. What faith may be put in the tests immediately preceding the day—and a day which will be frequently recurring—on which the calorimeter is sent away for repairs? Those who have had experience of the apparatus will appreciate this point.

Secondly, any error in the working of the calorimeter must of necessity be against the gas company; for it is obviously an apparatus which gives a correct reading when working at its maximum efficiency. As soon as any defect presents itself, it at once works below its proper efficiency; and the result is naturally against the gas company. For instance, should the coils become slightly corroded (either internally or externally), or should the coils contract a leak, or should the burners be coated with a slight covering of carbon, the fault will cause a reduction in the calorific power of the gas. No defect in the calorimeter itself could increase its efficiency. The writer has in his own experience of the apparatus found the faults just mentioned; and the cause of their discovery was in each case the registering of a low test.

The introduction of a standard in calorific power, though its application is at present only intended for the Gaslight and Coke Company, was, of course, expected sooner or later; and its arrival a year or so earlier than was anticipated does not make much difference to anybody. But the imposition of a standard which is obviously too high to apply to a mixed gas of 14-candle power is a matter of great importance to the companies now supplying, or who hope shortly to supply, this quality of gas. Whether or not it be the intention of the Gaslight and Coke Company, it will certainly create a precedent for other gas companies—and gas companies who will have no occasion to accept the calorific standard as a *quid pro quo*. The Gaslight and Coke Company stand to gain considerably from their amalgamation with the West Ham Gas Company; and, doubtless, from their point of view, it was good business for them to concede a point which, with their usual policy of limiting their percentage of water gas to a moderate extent, may not occasion them either expense or trouble. It may, however, resolve itself in the future into a most unfortunate precedent for other companies differently situated; and for this reason the action of the Gaslight and Coke Company is to be deprecated in accepting the standard named in spite of the fact that the experience of the published calorific power tests of the Commercial Gas Company—the only Metropolitan Gas Company (as already remarked) supplying a mixed 14-candle power gas—plainly shows that this standard cannot be regularly and, it should be added, profitably maintained.

Dr. J. B. Readman recently read a paper before the Royal Scottish Society of Arts, in Edinburgh, on "Liquid Fuels for Motor-Car Engines." In the course of his communication, he dealt with experiments he had made with 90 per cent. benzol—a substance which, he said, gave good encouragement from the beginning, as a substitute for petrol.

"Electric Power for Gas-Works" is the title of a little book by Mr. H. Staniforth, of Nottingham, which has just been published by Messrs. John Allan and Co., 8, Bouverie Street, E.C. The author has had several years' experience in both electrical works and in large gas-works, and in writing his book, which is intended for gas engineers and students, he has confined himself to plant adapted for use on gas-works. He begins with the dynamo, passes on to deal with switch gear, motors, and starters, and concludes with some remarks on wiring; the text and diagrams, which are numerous, occupying only 31 small pages. The price of the book is 2s. net.

IRON CARBONYL IN COAL GAS.

By J. N. E. Teune, Jun.

In a new Dutch gas-works, where coal gas is produced, it had been found that after a short time the mantles lost a great deal of their illuminating power, and that a yellow-brown deposit appeared on them. I was called upon to investigate the cause of this phenomenon; and I found, by examination, that the deposit was oxide of iron.

The following investigation is similar to that carried out by Heeren M. van Breukeleveen and A. ter Horst, and published in the "Journal" for Nov. 21, 1899. In the first place, I had to determine whether the gas contained iron in mechanical suspension, or a volatile compound of it. Consequently, 60 litres (2·12 cubic feet) of gas taken from the holder were filtered by being passed through cotton wool, and allowed to flow through a burner made of glass, where it was consumed; the issuing gases being subsequently scrubbed by dilute hydrochloric acid. On this being examined, no iron was discovered in the solution. Next, 1500 litres (53 cubic feet) of gas taken from the holder were scrubbed directly with hydrochloric acid; but it was impossible to remove the iron. The result of this investigation indicated also that the coal gas did not contain iron in a state of mechanical suspension, but as a volatile compound of iron carbonyl.

Mond, who discovered this volatile compound of iron carbonyl, made several examinations of it some years ago.* He found that on being exposed to the air it slowly decomposed, with formation of a brown precipitate consisting mainly of hydrated ferric oxide. The vapour density was determined in a Victor Meyer apparatus filled with hydrogen, and heated in a bath of xylene. Mond obtained the following figures: 0·1912 gramme of the substance displaced 25 c.c. of hydrogen at 17·7° C., air pressure 751 mm., and density, 6·5; 0·1249 gramme displaced 16·4 c.c. of hydrogen at 17·7° C., air pressure 759 mm., and density 6·4. This corresponds very nearly with the calculated density of $Fe(CO)_5$, 6·7; while $Fe(CO)_4$ would require 5·7, and $Fe(CO)_6$ would require 7·25. The formula $Fe(CO)_5$ is also corroborated by an analysis of the substance; the compound containing 29·08 per cent. of iron and 70·92 per cent. of carbonic oxide. Mond proposed to call this compound "ferropentacarbonyl." It is isomeric with ferrous croconoite (C_5FeO_5).

After this, the coal gas was examined in the manner described at the following points: (1) At the outlet of the "Standard" washer (the inlet to the purifier-house); (2) at the outlet of the Pelouze tar-extractor (the inlet to the washer); and (3) at the outlet of the hydraulic main. The gas from the main was free from iron; that from the tar-extractor contained iron carbonyl; and in the water in the washer there was a very small quantity of oxide of iron. One litre (1¾ pints) of water contained 0·0010 gramme of oxide of iron. On account of the small quantity of iron carbonyl in the coal gas, I have not been able to determine exactly the amount of iron, but the gas from the tar-extractor contained less iron than that from the purifier-house.

Finally, the gas was analyzed with the following result:

	Per Cent.
Carbonic acid	1·0
Hydrocarbons	2·8
Oxygen	0·5
Carbon monoxide	7 0
Methane	27·4
Hydrogen	56 9
Nitrogen	4·4
	100·0

This analysis indicates that the sample taken was quite an ordinary one; the gas containing also a normal quantity of carbon monoxide.

The results of the foregoing researches justify the following conclusions:—

1.—The coal gas produced at the works in question contained a volatile compound of iron carbonyl.
2.—The gas had not taken up iron from the elements.
3.—Iron carbonyl was not produced at high temperatures, because the gas from the hydraulic main was free from iron.
4.—The small quantity of carbon monoxide in coal gas, when left in contact with the iron of the mains at low temperature, may produce a compound of iron carbonyl.
5.—On heating the iron carbonyl at a high temperature in the burners, the compound is decomposed into iron and carbon monoxide.
6.—Iron carbonyl is not acted upon by dilute hydrochloric acid.

Some weeks after these researches were carried out, the examination of the gas from the holder was repeated, and I found a decreased production of iron carbonyl. I therefore concluded that the inside of the mains had been slowly covered with tar and naphthalene as the iron was removed from the action of the carbon monoxide.

Laboratory, Eastern Gas-Works, Amsterdam,
March 30, 1909.

* *Vide* "Journal of the Chemical Society" for 1891.

PROGRESS IN ILLUMINATING ENGINEERING.

The issue of our American contemporary the "Illuminating Engineer" for last month marks the beginning of the fourth year of the existence of that publication; and, in conformity with custom, the Editor (Mr. E. L. Elliott) devotes the first article to a review of the past year's doings in the field of illuminating engineering, and offers an opinion on the outlook for the ensuing twelve months. The conclusion arrived at from his review is that "illuminating engineering, as a distinct branch of applied science and a separate profession, has made very substantial and satisfactory progress;" and he ventures to predict equally good progress in the year on which we have entered. Though in the field of light sources nothing radically new was developed in the period under consideration, Mr. Elliott points out that it was marked by the very rapid introduction of the tungsten lamp and the inverted gas-burner; the latter being, in gas lighting, the "chief feature of progress." He says it has now been thoroughly adapted to American conditions; and its reliability and practicability have been demonstrated beyond any question of doubt. The so-called "gas arcs," constructed on this principle, made their commercial appearance during the past year; and, having undergone the trial of use at the hands of the public, they are destined, in the opinion of the writer, to advance very rapidly during the current year. He remarks on this matter: "It is rather curious to note the parallel progress in the production of light by gas and electricity. Thus, the inverted incandescent gas arc, in its distribution of light and higher efficiency, has striking similarities to the flaming arc lamp. While a single inverted burner apparently gives no higher absolute efficiency than the best forms of upright burner, it has a better natural distribution; and with its lower cost of maintenance, together with its novelty, has given to gas lighting a very substantial means of meeting the inroads which the tungsten electric lamp is in a strong position to make."

Mr. Elliott goes on to point out that a new form of gas-mantle, having remarkable qualities in regard to strength and maintenance of candle power, has passed the experimental stage, and been tested to a limited degree in practical use, so that it will undoubtedly become a commercial factor in gas lighting during the year. It is said that these mantles will run 1000 hours with a mere trifling reduction in light power, and that they are so strong mechanically as to even stand collapsing after they have been burned off. If these features hold good in commercial use, as there seems no reason for doubt they will, the writer says "they will afford an improvement in incandescent gaslight that will be not far short of revolutionary." The fact is also worthy of mention that in the new inverted clusters or "arcs" more elegant lines of construction are used; thus keeping the progress in the artistic side of light production on a par with the mechanical.

Attention is next directed to the fact that small upright gas-burners turned out as single units—*i.e.*, with burner, mantle, and chimney complete and self-contained, and sold at so low a price as to be within the reach of everyone (less than twice the cost of an ordinary 16-candle electric lamp)—have come into considerable use; and it is thought they will certainly have a large field of usefulness, and play no small part in maintaining the present position of gas and electric lighting. Mr. Elliott says it is interesting to observe that recent tests seem to prove that these small burners are the most highly efficient of any form of incandescent gas-lamp; and, on the whole, he considers it is safe to say that improvements in gas-lamps during the past year "have fully kept pace with improvements in electric lamps."

In conclusion, Mr. Elliott expresses the opinion that the past year was one which will be long remembered by the lighting interests of all kinds; and, without going into details, he considers that progress in the current year is likely to be most pronounced in the following lines: The installation of better systems of street lighting, both from the decorative and the practical standards; more aggressive action on the part of the gas interests to maintain the present status of gas lighting; more extended recognition of illuminating engineering principles both in the manufacture and the sale of lighting fixtures and accessories; and, finally, the continued increase in the recognition of illuminating engineering by those largely interested in the subject of illumination, including the users of light, architects, contractors, and the producers of all illuminants.

American Gas Coal for the Mediterranean.—According to a telegram from Pittsburg which reached London through Reuter's Agency, a Company has been formed for the transport of gas coal to the Mediterranean; the ships returning with cargoes of Spanish iron ore. The company expect to handle on an average 20 million tons of coal and half that weight of ore annually. It is stated that the new service will begin in a few months' time.

London and Southern District Junior Gas Association.—The members of the Association will pay a visit to the Croydon Gas-Works next Saturday afternoon. On the 23rd inst. a meeting will be held at the Cripplegate Institute, when Mr. T. V. Fenn, of the Gaslight and Coke Company, will read a paper entitled "Gas Consumers' Accounts: On Avoiding and Settling Disputes." The long anticipated visit to Woolwich Arsenal has now been arranged for Wednesday, May 12.

GAS MAKING WITH COAL BRIQUETTES.

The specification has lately been published of a French patent taken out by MM. Bienaimé and Requier for improvements in the manufacture of illuminating gas, with the view of effecting greater economy than is possible with the methods now in use. The patentees point out that, under existing arrangements, coke loses some of its value as a marketable commodity owing to the fact that it has to be broken for sale, with the consequent production of useless dust. This is obviated by the patentees' process, which, they claim, allows of the utilization of the breeze for the production of gas, and facilitates the charging and drawing of retorts, especially those set on the inclined system.

The process consists in first screening the coal and then breaking the lumps. The dust is mixed with a small quantity of pitch or tar (4 per cent. as a maximum), or a combination of both, or any other suitable binding material, compressed into block, and carbonized. The process cannot be employed with all kinds of gas coal, as some intumesce too much during distillation; but it is stated to be very profitable with those which do not swell after compression. It has also been found advantageous in gas-works in which leaner coal than that which is obtained in the locality is carbonized. The solid residual produced by the patentees' process is a well-proportioned compressed coke making no dust in handling, and selling at prices which it is considered would amply repay the cost of compressing the raw material. Another feature of the process is that no caked residue is left on the retorts, necessitating its detachment by special tools.

HIGH-PRESSURE GAS SUPPLY IN INDIANA.

At the recent Annual Meeting of the Indiana Gas Association, a paper was read by Mr. W. B. MacDonald, the General Manager and Vice-President of the Evansville Gas and Electricity Company, in which he gave an account of the installation of high-pressure gas supply in some of the outlying districts of the city. The following are some extracts from the paper.

During the summer of 1906, owing to a systematic and energetic canvass of the city, especially the residential section, a large number of houses were piped for gas, and a great many gas-stoves, gas "arc" lamps, and water-heaters installed, which resulted in such a material increase in the output that the situation in Evansville for a proper distribution of gas had, by the middle of August, become acute. With a pressure of 4·2 inches at the station governor, only about 1·5 inches was available at the three outlying districts—viz., West End, South End, and Howell. Perhaps the greatest sufferer was the second, inasmuch as a house-to-house canvass showed that there was a gas-range, a water-heater, or some other domestic gas appliance besides the house illumination in practically every household. With this increased load, the season for lap loads was drawing near; and to be ready for the demand that was inevitable, and meet the situation quickly, was the problem that confronted me.

Three plans for an increased distributing plant were considered: (1) To increase the number of the trunk mains from the works to the outlying districts; thus feeding into the distributing main a larger volume of gas with the holder pressure. (2) To erect gasholders in each affected district. (3) To break away from the old and established practices, and instal a high-pressure system. Calculation and investigation showed that the last-named plan was the only one that held out reasonable hopes of completion in time to meet the situation.

The high-pressure system was accordingly adopted; a very favourable route laid out; and work commenced on the 1st of September. From that date until its practical completion—a period of 26 working days—the work was pushed on with feverish haste; and not till the last regulator was installed and the last record taken, was there any diminution in the call for speed. The line is 25,344 feet in length, of 4-inch wrought-iron pipe; the lengths averaging 22 feet, connected with Dresser couplings.

Simultaneously with the starting of the work of laying the line, a 9½-inch by 14-inch Westinghouse compressor was installed at the gas-works. This compressor supplied the air pressure with which the line was tested—each day's work being subjected to 40 lbs. pressure from 6 p.m. until 7 a.m. the following morning; and not until the line showed a perfect test for these hours was it backfilled. By the 1st of October, the pressure had so materially increased on our outlying districts—*i.e.*, 15-10ths to 27-10ths—that my anxiety for the lap load was relieved; and thereafter the finishing touches to the work were prosecuted in a less feverish manner.

As the stove and heater load drew nearer to the lighting load, and the reports from the complaining districts showed that the pressure was being maintained at 36-10ths, the point at which the regulators were set to deliver, the relief and satisfaction apparent in the General Manager's office was reflected through all the various departments.

Bristol recording pressure gauges are maintained at four points on the low-pressure mains—one in the South End, one in the West End, one at the office of the Superintendent of Distribution, and one in the business district. These charts reach me by 9 a.m. the following morning, at the same time that the compressor, steam, and works charts are given to me; so that the previous day's record is at hand in order that any corrections or changes for the day may be intelligently considered.

Simultaneously with the work of laying the line, the installation of the compressors and attachments was carried out at the works with the same push and energy that characterized the work on the outside. A Westinghouse 9½-inch by 14-inch steam-driven compressor, with a capacity of 0·5 cubic foot per stroke and a maximum speed of 140 strokes a minute working against 10 lbs. pressure, was installed. This compressor and the one used for line-testing was connected by a 2-inch suction line leading to the outlet of the storage holder. Cut in on this line is a 12-inch by 18-inch steel tank.

The discharge side of the compressors is connected to a 4-inch line which discharges into a 66-inch by 190-inch steel tank conveniently situated. The tank takes up the pulsation of the compressors, and ensures a steady pressure on the lines—also collecting a great portion of the condensation. We have a Bristol recording gauge in the exhauster-room near the compressor, which gives a daily record of the pressure; and during the first year a steady pressure of 10 lbs. was maintained.

During the summer of 1907, the increase in business—much of which was secured on the high-pressure line—sounded the alarm signal that the maximum capacity of delivery was again being reached; and, to take advantage of this warning, an 8-inch by 14-inch by 8-inch steam-driven double Clayton compressor, having a capacity of 2 cubic feet per revolution—approximately 25,000 cubic feet per hour—as the maximum, working against 10 lbs. pressure, was installed. The suction and discharge lines were arranged similar to those of the Westinghouse compressors. With this equipment, we have been enabled to meet all demands, and at the same time maintain a pressure on our low-pressure mains with a variation of 12-10ths in the West End, 10-10ths in the South End, and 5-10ths in the business district; while the North End, where the other recording gauge is located, shows a variation of 7-10ths. All these variations occur at the peak load. At other times the pressure is uniform, and maintained at that of the holder.

A test for the cost of compression, made two months after the Clayton compressor was installed, gave a cost of 0·85 c. per 1000 cubic feet; this cost being for coal only. Maintenance and repairs were not considered. The coal used was West Kentucky pea and slack, at 88 c. per ton laid down on the boiler-room floor, and giving an efficiency of 6 lbs. of water evaporated to 1 lb. of coal consumed. The repairs to the compressors have been trifling, and such as could be done by our own employees.

I am not prepared to say that the quality of gas suffers in candle power by compression, inasmuch as we have not made tests on the high-pressure gas for it. The gas compressed in Evansville is 18-candle coal and water gas, mixed in the proportion of one-fourth water gas to three-fourths coal gas.

Rating of a Tenant's Machines and Tools.

The Secretary of the Machinery Users' Association (Incorporated) calls attention to the case of *Edmund Evans, Limited, v. Assessment Committee of the Southwark Union*, which, he says, affords a striking instance of the failure of an attempt to rate an occupier's machines and machine tools. The appellants, a firm of colour printers in Southwark, shortly after the quinquennial revaluation of 1905, removed some of the printing-machines and paper-cutters then upon the premises, and substituted for them others of a similar nature, but of an improved type, of which the cost was greater than that of the plant removed. The respondents thereupon increased the assessment, and when the appellants appeared before them in support of their notice of objection, it appeared that the increase had been arrived at by putting a percentage upon the increased value of the machinery. The firm appealed to the London Quarter Sessions, alleging that there had not been any alteration in the value of the rateable hereditaments within the meaning of sections 46 and 47 of the Metropolis Valuation Act, 1869, and that therefore the assessment should be struck out. Apart from the technical point, the case raised the direct question of the rating of a tenant's machines and machine tools in such a manner as the appellants were advised would best allow of a decision being obtained which would put a check on the rating authorities attempting to extend in any way the principle of earlier decisions affirmed by *Kirby v. Hunslet Union*. In order that this point might not be obscured by any technical considerations, the appellants' solicitor withdrew all technical matters. Nevertheless the respondents declined to proceed further with the case, and consented to an order that the new assessment should be struck out, and that they should pay the appellants' costs. A direct attempt to rate an occupier's machinery and machine tools was thus effectually frustrated. The appellants were advised by the Association, through their Solicitor and Surveyors, Mr. B. Duncomb Sells and Messrs. Humphreys-Davies and Co.

A recent issue of the "Mining Journal" contained an article on "Gas Producers and Gas Firing," setting forth the advantages of the latter over the direct use of coal. The author was M. Ernest Schmatolla, a metallurgical and chemical engineer and a specialist in gas-firing; and he has had the article reprinted as a pamphlet, which is published at the office of the paper named, No. 46, Queen Victoria Street, E.C.

INFORMAL MEETING OF SCOTTISH GAS MANAGERS.

Annual Meeting in Glasgow.

[From Our Own Correspondent.]

A pleasant, and there is reason to believe, profitable, Informal Meeting of Scottish Gas Managers was carried through in Glasgow on Wednesday, without, it is to be observed, any vocal assistance from either Edinburgh or Glasgow. Probably the leaders of the gas world in those cities are busy in the solution of the problem of carbonizing in vertical retorts, and have no time to discuss lesser questions. It was another noticeable feature of the meeting that vertical retorts were not once mentioned, from which it is to be gathered that the gas managers of all except the very largest undertakings are not, as yet, troubling their minds very much about them. There was no mention of the enriching of gas, except the statement that at Alloa the effect of the working of retort-house governors has been to enable Mr. Napier to almost altogether dispense with enrichment. Neither was there any reference to high-pressure distribution of gas, further than the regret of the President that time did not allow them to discuss it; nor to high-pressure lighting. Comparisons with electricity were also awanting. This is a heavy roll, on the negative side, of subjects of importance at the present day, which the meeting did not take up. At the Informal Meeting the discussion is on the President's Address. As he leads, so the speakers follow; and we have to turn to the address to find the positive side of the proceedings. Though the subjects enumerated were omitted from Mr. Vass's excellent production, there was no lack of subjects of interest in it. His reflections on company management of gas undertakings, as compared with corporation management, was particularly fitting at the present time, as the period is approaching when many corporation undertakings will, through the operation of sinking funds, be set free from their original capital obligations. The part of Mr. Vass's address which went farthest home in the minds of his hearers, was his narrative of the exceedingly successful campaign he has carried through against the non-users of gas. This was an educative record of work deliberately planned, and resolutely carried out, with results which have been most gratifying, both in the amount of new business which has been gained and in the almost infinitesimal cost which has been incurred in gaining it. On this subject, the remarks of the speakers centred round the granting of gas-cookers free—a practice which, it seems, is much more extensive than could have been supposed, from previous references to the subject. There was some allusion to automatic street lighting, but nothing authoritative, only speculations as to the adaptability of the two systems of pressure and clockwork operating devices, both of which, in the opinion of most, have serious drawbacks. Other subjects of less importance were handled; the result being an extensive interchange of views. There was a very gratifying attendance of managers at the meeting. It must not be omitted to mention that the gold medallion and chain which has been procured by subscription, in memory of the late Mr. James M'Gilchrist, of Dumbarton, was worn by the President for the first time; being appropriately handed over by Provost Macfarlan, of Dumbarton, in a fitting appreciation of Mr. M'Gilchrist's personality and the work that he carried on for the "Informal Meeting" for so many years.

The Twenty-Sixth Annual "Informal Meeting" of Scottish Gas Managers was held in the Alexandra Hotel, Bath Street, last Wednesday, under the presidency of Mr. D. Vass, of Airdrie. There was a very good attendance.

The M'Gilchrist Memorial.

Mr. W. B. M'Lusky (Perth), the Convener of the meeting, said their first business had to do with the M'Gilchrist Memorial. Provost Macfarlan, of Dumbarton, had kindly agreed to take part in the proceedings. The Committee considered the medallion (reproduced in the "Journal" a year ago) a work of art, and a very fitting memorial to their old friend. They recommended the appointment of Trustees to have the custody of the medallion from year to year; and, to simplify matters, they selected the late Convener (Mr. A. Yuill), himself, and the three Past-Presidents—Mr. Vass, Mr. G. R. Hislop, of Paisley, and Mr. J. W. Napier, of Alloa. The memorial was there; and he had only to say that the work was just the kind which Mr. Macgregor had done for the Royal Family—neither better nor worse. It was a perfect likeness of their late colleague. In their name, provided they agreed, he had to ask Provost Macfarlan to receive it for Mr. M'Gilchrist's friends.

Provost Macfarlan said that Mr. M'Gilchrist was a "bairn" of Falkirk, and he well maintained, through his long career, the traditional reputation of the "bairns." They could read in every line of him, "*Nemo me impune lacessit*," that was to say, "No one touches me with impunity." He came to Dumbarton a young man—and was there for thirty-two years—after he had had some experience at Maryhill and elsewhere. They knew him as a gas manager, and they knew him as a man. His career was cut all too short; and yet they were safe in saying that he crammed—he used the word advisedly—into that short existence of his more than many of them would be able to do, although they should reach the promised span of life. He was an enthusiast in his profession; and never for a moment did he falter in the conviction that, in spite of electric lighting or anything else, there was always a future in store for gas lighting. This led him to observe that the advent of electricity, while it was a matter of great concern for some of them, had really been, in the end, a big service done to the gas profession, because it stirred everyone up to see whether something was not left latent in the possibilities of gas lighting; and they knew, without boasting, that they were now, at least, level with the electric light once more. In such a handsome presentation as was there, to commemorate Mr. M'Gilchrist's memory, they saw and felt that the whole proceedings of that day, and the preparatory proceedings, were thoroughly justified. Sometimes testimonials were apt to be questioned—that was to say, there was no open revolt against them, but there were smouldering observations of a contrary character. He was quite sure there was nothing of this kind among those present. Mr. M'Gilchrist was no ordinary man. They could not be in his company for long without realizing that there was strong virility in him. He had his profession thoroughly at heart; and to the end of his days he continued to labour at the problem of the best that could be done with coal gas. He was, they might say, the father of the Informal Meeting of Gas Managers. In 1884 they started the meetings; and for a number of years Mr. M'Gilchrist was the Convener of them. He was succeeded by Mr. Yuill, who was, in turn, succeeded by their present professional-like Convener, Mr. M'Lusky. There was no labour too great for Mr. M'Gilchrist in ensuring the success of the meetings. He was a man—without in the least detracting from anyone—who was a recognized authority in his profession; and he could say this from direct personal intercourse with him for a long period of years. It was, therefore, with the greatest satisfaction that he added his little tribute of respect to his memory. In the town in which he spent the greater part of his busy life, Mr. M'Gilchrist was no cipher. He did not confine himself merely to the routine duties of gas manager, but he did good to Dumbarton in his day and generation. He served for quite a number of years as the Quartermaster of the local Artillery Volunteers, and was on parade within but a few days of his death. Then he gave service in the School Board of Dumbarton. He stood a contested election upon his own individual person, and was successful; and he continued his membership to the close of his life. In addition to this, there was no good object in their community that had not in him the warmest supporter. To the close of his life he was engaged in as many schemes for the help of his fellow mortals as would have kept any ordinary man fully occupied, without any managership of any other kind. They knew how quickly many men passed away from memory, and passed away from being even spoken of; and yet, at the lapse of close upon three years, he might say that Mr. M'Gilchrist was almost with them—at all events, they had a vivid idea of him, and imagined that he only passed from them the day before yesterday. It was, therefore, very fitting that they should take upon themselves the idea of commemorating him in the handsome medallion and chain of office which was to be worn by their Presidents, year by year, as time rolled on. He was delighted to think that the work of preparing the memorial was entrusted to his old friend Lord Provost Macgregor, of Perth, because everyone who knew him and his work knew that he would never turn out anything but the best workmanship. Therefore, they had before them that article of beauty, embracing, as it did, what he would call a lifelike representation of Mr. M'Gilchrist upon the medallion. Mr. M'Gilchrist was a man who could never listen to a story of hardship without instinctively, as it were, going to the assistance of those who appealed to him in distress; and in this way he could tell them he was a generous giver for every good object, and a generous giver in private, which the bulk of them knew nothing about—a man who never failed within his powers to come to the help of the needy. He had a son, the Manager at Gourock, in whom he justly had pride. Unfortunately, about a couple of years later, he passed away also, when he was on what he would call the first rung of the ladder for success. This was a great grief to him (the speaker) and others, because they had fondly looked forward to the son getting forward to, perhaps not exactly the high pinnacle that his father had attained to, but to an honourable position in the gas profession. He was sorry

to say that Mr. M'Gilchrist's widow had not been in the best of health for some time. He had made her and the family aware of this meeting, and of what was likely to take place at it; and he was sure it would afford her a gratification of the highest kind, although it should be tinged with the melancholy remembrance of the loss of her invaluable husband—for he was a devoted husband, and looked to his family up to almost the degree of indulgence. He was speaking with a certain amount of weight on his shoulders, because Mr. M'Gilchrist and he for a long period of years were closely associated with one another in various departments. He was his Convener for a long time, and they sometimes differed; but he might say they never had a bitter quarrel, and never had anything that prevented them being on the most cordial of terms beyond a single hour. He felt that he had not given justice to the subject in hand; but he had done what he should have liked to have done for Mr. M'Gilchrist. He had done his very best in addressing them in these disjointed sentences; and he was quite sure that they never were engaged in anything more meritorious in the shape of the commemoration of any worthy individual than they were that day. He had the honour and privilege of placing the medal upon the shoulders of the President. He trusted that it might be handed down to many generations of Presidents, and that, as time went, new members coming in would ask: "What means this?" and they and their successors would be able to tell, and to tell truly, that the medallion was in memory of a worthy man who was one of themselves in the days gone by. He had also to formally say that, in so far as the widow and family were concerned, should they at any time be entrusted with the medallion, it would be held by them as next to sacred, and returned to the proper quarter. He suggested that it might be allowed to go to Dumbarton, to be shown to Mr. M'Gilchrist's widow and family; and that then they might permit him to exhibit it—perhaps in one of the principal windows in the town—for a little time, after which it would be returned to the proper custodian for the time being.

The meeting having signified their agreement, Provost Macfarlan placed the chain round the neck of the President.

The PRESIDENT expressed himself as feeling it a great honour to be the first President to be called upon to preside over a meeting adorned with such a memento of the founder of the Informal Meeting. He felt it also an honour to be elected one of the Trustees whose duty it would be to see that Mr. M'Gilchrist's memory was kept green by the adornment of their future Presidents from year to year, and that the Informal Meeting might be kept long in existence. He felt sure that the memento was the touchstone to secure such an end. Provost Macfarlan had very well laid before them their ideal of Mr. M'Gilchrist. They all cherished his memory; and it would be ill-befitting in him to add anything to the words he had so well spoken. He had, therefore, on their behalf, to ask Provost Macfarlan to convey to Mrs. M'Gilchrist and her family their feelings on this memorable occasion, and to say that they, as an Informal Meeting, would always hold green, and revere, the memory of its founder.

Mr. R. M. SUTHERLAND (Falkirk) said it gave him great pleasure to be present to take part in this function, and to feel assured that the memory of his old schoolmate, Mr. M'Gilchrist, was going to be continued at the meetings of the gas managers of Scotland. Provost Macfarlan, in fitting language, had adequately described the character he had spoken about as one who desired to help wherever help was needed. As an old schoolmate of their late friend, he could endorse the remarks—they were so true of the character of their late friend. He felt it was a very kind thing of gas managers to resolve to commemorate the active business career of Mr. M'Gilchrist in so appropriate a manner. Mr. M'Gilchrist always had the interest of the gas profession at heart. No one did more to hold aloft the lamp, as it were, of his profession; and he was for ever striving to do what he could to help forward the industry. Even in the days when the electric light was threatening to extinguish gas, their friend never lost heart, because he had always plenty of courage. He said that gas would hold its own; and his forecast had proved true.

The President then delivered his

INAUGURAL ADDRESS.

I have to thank you for the honour you conferred in electing me to preside at this the Twenty-Sixth Annual Informal Meeting. I have a veneration for old institutions, for the legacies of good work handed down from the past years; but I also hold strongly to the belief that the continuity of the life of our old Associations depends on their adapting themselves to the needs of the times. Our Informal Meeting would lose all its charm if it departed from the free-and-easy style of discussion which has hitherto characterized it. It best serves its purpose when current topics are brought under discussion, whether they are called out by the Presidential Address or by a leading from the "floor of the house." So far so good; but in other matters it may be found advisable from time to time to trim our sails to the prevailing wind. To-day I deal chiefly with matters which have come before me during the past year or so, in the hope that the discussion thereon may exceed the address in value and importance.

CORPORATION V. COMPANY OWNERSHIP.

Some of us who are managers of corporation works are frequently asked why it is that gas companies, as a general rule, can sell their gas cheaper than corporations, especially where works have only recently been acquired by the authorities. We all know that it is the burden of the sinking fund for the redemption of capital which a corporation is bound to provide, and for which a company has no equivalent charge, that makes the difference. Then follows the natural question: Is it not better to allow the gas supply to remain in the hands of a company than burden the gas consumers of the present day in providing a "bond free" concern to a future generation, and wherein does the inducement for corporations to become owners lie?

This is best expressed by taking a supposed case—let me say a gas company with a capital of £100,000, and paying a dividend of 5 per cent., equal to £5000 per annum. If this were a statutory company, they would be entitled to a price of something like 28 years' purchase, and would therefore cost the corporation the sum of £140,000. The corporation then borrowing (say) at 3½ per cent. would have an annual charge of £4900, or nearly equal to the full dividend of the company, but in addition would require to provide a sinking fund to redeem the capital sum within a given period. Recently the "powers that be" have greatly reduced the period of such repayment; for whereas in earlier days fifty years were allowed, it is now difficult to get more than thirty years. Taking thirty-five years, it requires 1½ per cent. per annum accumulative on the capital sum of £140,000, which amounts to £2100. Then, owing to the present mode of rating, the rates and taxes on this sum fall to be added as an annual charge, making, at 5s. in the pound, £425, or a total of £2525 per annum, which the gas consumers of to-day have to pay for the privilege of "owning the gas-works."

Taking the sales of gas to be 140 million cubic feet (which gives a million per £1000 of capital), the charges work out as follows:—

	Pence per 10 o Feet.
Gas company's dividend, £5000	= 8·578
Corporation interest on loans, £4900.	= 8·400
Sinking fund for redemption of loans, £2100	= 3·600
Rates and taxes on sinking fund, £525	= 0·900
	12·900

A difference of 4·322d. per 1000 cubic feet in the selling price of the gas. Under such conditions, one would say that it is folly for a corporation to think of acquiring the control of the gas supply; and so it is, if the business is a stationary concern—one which has reached its limits. But when the undertaking is a progressive one, and one which requires new capital to keep pace with that progress, it is then that the corporation ownership will have telling effect, and will justify a transfer to municipal management, as the charge on new capital, under a corporation, for interest on loans, as shown above, is less than the amount required for dividend under company management—the difference being usually sufficient to provide for the necessary sinking fund; as, for example, in an undertaking on the lines already laid down, and which requires to provide for a capital increase (say) in the next fourteen years' time or so of £60,000, which would be sufficient to meet an output of double the present manufacture. The annual charges then adjusted on an output of 280 million cubic feet would be—

		Pence per 1000 Feet.
For company, on £160,000—		
For dividend at 5 per cent.	£8,000	= 6·857
For corporation, with loans amounting to £200,000, at 3½ per cent.	£7,000	= 6·000
Redemption of loans, at 1½ per cent. . . .	3,000	= 2·571
Rates and taxes on £3000	750	= 0·643
Total	£10,750	= 9·214

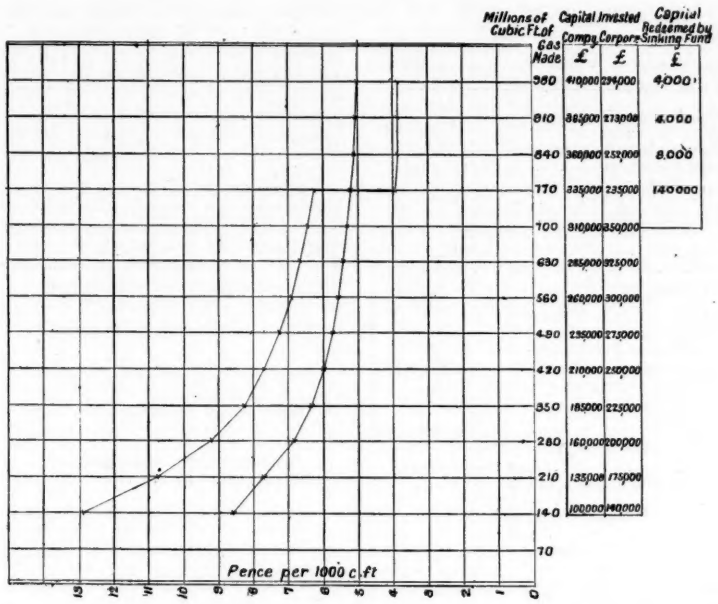
Now the difference in the selling price is only 2·357d. with the prospect of a gradual reduction of the difference as the sale of gas increases, and of a substantial fall when the period for the redemption of the loans comes round.

It will, however, be found that, under the conditions cited as our example, though the difference in capital charges gradually narrows, the charges under corporation management will not go below those of company management until the period of thirty-five years, when the sinking fund on the purchase price falls out of account. This will be better followed by a glance at the charges based on a regular annual increase of 5 per cent. per annum in manufacture, and the probable capital to meet the periodical increase.

After the thirty-five years, the difference would then be in favour of the municipally-owned undertaking. Circumstances would vary as the ratio of increase in manufacture varied; but I have only taken an example to show the ultimate end after a shorter or a longer period, according to the development of the locality, &c. I also give, in diagram form, the results named in the table.

EXTENSION OF BUSINESS.

For several years the undertaking of which I am now in charge had been run with very insufficient gasholder accommodation, and no surplus of retort power. Circumstances led to both matters being righted, and a good margin allowed for expansion in each case. Other parts of the plant being also brought into line, my Committee found themselves with heavy capital charges for the extensions on the one hand, while against this there were works capable of expansion. Realizing that development of sales



Annual Manufacture.	Capital.		Capital Charges per 1 00 Cubic Feet.		Difference in favour of Company.
	Company.	Corporation	Company	Corpn.	
	Cub. Ft.				
Beginning with	140,000	£100,000	£140,000	8·578	12·900	4·322
After say—					
8 years	210,000	135,000	175,000	7·714	10·750	3·036
14 ,,	280,000	160,000	200,000	6·857	9·214	2·357
19 ,,	350,000	185,000	225,000	6·343	8·268	1·925
23 ,,	420,000	210,000	250,000	6·000	7·679	1·679
26 ,,	490,000	235,000	275,000	5·753	7·240	1·487
29 ,,	560,000	260,000	300,000	5·572	6·811	1·339
31 ,,	630,000	285,000	325,000	5·429	6·653	1·224
33 ,,	700,000	310,000	350,000	5·314	6·450	1·136
At 35th year	770,000	335,000	375,000	5·221	6·283	1·062
Beginning—						In favour of Corporation
36th year with	770,000	335,000	235,000	5·221	3·937	1·284
37th ,, ,,	840,000	360,000	252,000	5·143	3·870	1·273
39th ,, ,,	910,000	385,000	273,000	5·077	3·870	1·207
40th ,, ,,	980,000	410,000	294,000	5·002	3·870	1·132

would be the best means of reducing the ratio of these charges, they set about seeing where such development was possible; and after inquiry, they adopted (1) free cookers, (2) special rate for industrial purposes, (3) hiring-out radiators, and (4) carcasing or refitting houses.

Free Cookers.—Whether from the desire to save cooker rental or from whatever cause, we had been burdened for several winters with an uncomfortable accumulation of cookers returned from hire. Previous to this, and chiefly on account of the difficulty of collecting cooker rentals from slot consumers, we had to abandon the separate charge to this class of consumer, and had included all in the gas-rate, so that our revenue from cooker hires amounted to only 0·5d. on the total gas sold to consumers other than those on the slot system; and it was decided to venture the loss of revenue from this source in anticipation that it would be recouped by an extra sale of gas through the use of these cookers lying in stock. This policy resulted in a demand in excess of the stock, so that I had all stocks cleared. I have since instituted a periodical survey so as to see that cookers and grillers are being used; and where they are not, I get them brought into use or removed to the works, and satisfy further inquiries from returned stock.

Special Rate for Industrial Purposes.—In these days of competition with other sources of power and cheap fuel, we require to consider to what limit we can go in order to secure sales that would otherwise go past us; and my Committee agreed to reduce the price of gas used for industrial purposes to a rate which works out to an average of 2s. 2½d. per 1000 cubic feet, against 2s. 10d. for ordinary lighting purposes—equal to a discount of 20 per cent. In our present circumstances, this is equivalent to meeting all costs in full with the exception of interest on loans and the sinking fund, half of which only is covered. Had we reached this stage about twelve months sooner, we should have prevented the introduction of at least one producer plant. We have since decided to give a further discount of 5 per cent. on all industrial accounts exceeding £100 per annum; and by this further concession we have secured a new consumer who hesitated between producer and town gas.

Hiring-Out Radiators.—Many years ago I tried the hiring-out of gas-fires, offering both simple hire and hire-purchase; but my experience then with stoves returned after one season's use was such that I have since always avoided the hire of heating-stoves. The gas-fire cannot, after use for one or two seasons, be freshened up at a reasonable cost to admit of its going out again as equal to new. With radiators, however, we have a field which I think we should cultivate. True, the consumption is low. But I look to the upkeep being small; and a rental sufficient to meet capital charges and upkeep, irrespective of consumption, will still be low enough to induce business.

Fitting-Up New and Re-fitting Old Properties.—Fitting-up new properties with gas pipes and brackets seldom comes within the scope of our towns in Scotland, as these are invariably provided by the proprietors; so that our field in new properties is a small one. But, through making a comparison of the burgh valuation roll with our survey-book, we were able to make up a roll of all premises within our area of supply which did not use gas. This roll gave a total of 1345 premises not on our book, from which there fell to be deducted for premises unsuitable or already lighted by electricity 131, leaving a roll of 1214. A survey of the district brought out the following details:—

	Houses.
(*a*) Willing to have gas if slot-meter fixed, and already gas-fitted	191
(*b*) Willing to have gas if slot-meter fixed. No gas fittings, or fittings in bad order	799
	990
(*c*) Will not have gas	142
(*d*) Empty houses	82

The houses where gas-fittings were in good condition were immediately taken in hand and supplied through slot-meters. The other 941 were chiefly premises where gas had once been fitted, but where, by long disuse, the fittings and pipes were in bad repair, and the proprietors would not go to the expense of gas-fitting. An estimate was made of the average cost of fitting such premises complete with brackets, and was reckoned at 20s. per house of two apartments. The capital charges for interest and repayment in five years for this internal work came to 4s. 6d. per meter per annum; and it was proposed to make an extra charge of 6d. per 1000 cubic feet above the usual rate for five years in order to repay this sum.

At first there was some difficulty with the Landlords' Association; but, having satisfied them that it would not be to our interest to remove the fittings again when once they were in, we had no further difficulty, excepting that of meeting the demand, and quite a number of those appearing on the list as "Will not have gas" were among the applicants. Instead of undertaking the work with our own staff, we invited tenders from local tradesmen, and issued a detailed schedule (see p. 92).

This obviated difficulty as to time taken by tradesmen to do the work, as they were responsible to their employers; and when men know that work is under contract, they usually act accordingly. The measuring-up was done fortnightly, and included inspection—representatives from the Gas Department and from the contractor going over the work together. Our own men afterwards delivered and fixed cookers or grillers, everything being in readiness for the final connection. The cost of the pipe to the griller or cooker was not estimated in the 4s. 6d. annual capital charge. Within six months we had fitted 620 houses in this manner, and 170 were fitted in houses already piped. To this scheme we mainly attribute our increase of 7,347,000 cubic feet, being 11·7 per cent., in the gas sales during the past nine months, and this in the face of very dull trade, which would undoubtedly have brought about a decrease under ordinary circumstances.

DANGEROUS GASALIERS.

While on the subject of distribution, I would just like to note that the London Gas Companies not only advise the removal or conversion of the water-lute gasalier, on account of the danger

Schedule of Gas-Fitting Work.

Item.	Description of Material and Work.	Rate.
1	¾-inch Service coupling and connecting same . . .	
2	Connecting gas-meter inlet and outlet . . . . . (Stopcock will be supplied with meter.)	
3	⅝-inch tinned compo. pipe (for inlet) . . . per foot	
4	½-inch ,, ,, ,, (for main supply-pipe) ,,	
5	⅜-inch ,, ,, ,, (for branches) . . . ,, (Including fixing, but not including coupling joints.)	
6	½-inch branch unions, including solder and time, per union	
7	⅜-inch ,, ,, ,, ,, ,, ,,	
8	Holdfasts . . . . . per dozen	
9	Brackets, including soldering and fixing . . . each *Note*—Each bracket to be fitted with Bray's adjustable union-jet burner of suitable size, unless the tenant arranges otherwise with the *Contractor direct*	
10	Flexible tube backs, including soldering, cutting mantelshelf, and fixing (but not including flexible tube) each	
11	Slapping holes in walls and replastering, &c., for 6-inch wall . . . . . each hole	
12	Slapping holes in wall and replastering, &c., for 11-inch wall . . . . . each hole	
13	Slapping holes in walls and replastering, &c., for 16-inch-wall . . . . . each hole	
14	Slapping holes in walls and replastering, &c., for 22-inch wall . . . . . each hole No allowance will be given for extras, and Contractor must make good any damage to property, and relieve the Committee of all claim in this respect.	
15	Flexible tube connection (B), with backwings, including soldering (alternative for item No. 10)	

arising from its use, but they are also undertaking its conversion, for consumers, free of cost. The need of such action will be apparent to us all; for while the responsibility for accidents arising from defective gasaliers does not lie directly with the gas suppliers, every such accident has a prejudicial effect far reaching in its tendencies. I propose, at the earliest opportunity, to follow the lead of the Metropolitan Companies, and so avoid accidents caused by falling balance-weights, &c.

LABOUR DISPUTES.

Fortunately, organized labour disputes in gas-works are not frequent. It was my misfortune to have to deal with one in the press of the winter work of the past season. I will not go into detail of the trouble further than to say that my Committee, after investigating terms and conditions in the neighbourhood, agreed that the amount of work demanded was not excessive, and was a fair average of the district as a whole. But the information obtained from such an experience is useful, and I would summarize it thus: (1) Circumstances may arise in a district which make for an abnormal demand in labour; and gas-works have a difficulty in securing satisfactory labour unless special inducements, such as lightening of work or increase of pay, are held out. (2) That on a reversion of the circumstances noted above it is almost impossible to revert to the old conditions of gas-works labour. (3) That these two conditions (Nos. 1 and 2) may react on other gas-works where the same set of circumstances do not exist. (4) That the provisions of the Conspiracy and Protection of Property Act will not deter men from leaving on short notice. (5) That a system of deferred bonus would be one of the best means of preventing a strike being used as a lever to adjust an alleged grievance.

AUTOMATIC STREET LIGHTING.

This subject is associated in my mind with the preceding, for my attention was first called forcibly to the subject in passing through the city of Newcastle some years ago, and being there confronted with the unusual spectable of flaring gas-lamps everywhere in broad daylight. The lamplighters had been on strike for some days, and the only resource was to keep the lamps burning night and day. The possibility of such an occurrence, and the danger of its coming our own way some day, are sufficient to justify the consideration of automatic street lighting by every engineer in charge of it, apart from the saving it effects in gas and wages. Against this has to be set the question of displacing manual labour by mechanical appliances; and at the present time this is a serious question, and one which weighs heavily with corporation undertakings. With a return of better employment in the country in general, this question of the displacement of labour in departments of manufacture or distribution cannot be allowed to stand in the way of the development of gas engineering, any more than it would in any other branch of engineering or manufacture; and automatic controllers, either of the clockwork or pressure operator form, are bound to come rapidly into use.

SICK BENEFIT SOCIETY.

A very brief spell of idleness through sickness soon leaves workmen (even men such as stokers and fitters, who earn a fair average steady wage) with scant resources. I have often urged on the workmen under my charge the advisability of joining some of the existing friendly societies; but my persuasions and example in this respect had little, if any effect. Recently, however, the proposal came from them to form a society of their own; and, thanks to the assistance from similar societies in the gas-works in Glasgow and Edinburgh, we have now made a fair start with ours on a permanent basis. Enrolment is entirely voluntary. In the case of winter hands, payments cease when they leave their employment in the spring; but on returning in the autumn the resumption of payments entitles them to immediate benefit. We have 26 members out of a possible 36, including the office staff and officials.

WATER GAS.

The difficulty of disposing of surplus coke during the past winter has raised in the minds of managers even of moderate-sized works the possibility of introducing water gas; and in the hope that this would also lead to a reduction in costs, my Committee made inquiry as to the expense of installing and working such plant. The inquiries are not yet completed; but the data already under consideration give the manufacturing cost of water gas for one-third of our total output as follows:—

	Pence Per 1000 Feet.
Coke for generators, at 7s. per ton	1·32
Breeze for boilers, at 1s. 6d. per ton	0·06
Water, at 6½d. per 1000 gallons	0·56
	1·94
Wages of two men, at 5s. per shift	0·80
Oil and sundries	0·04
	2·78
Enrichment to 16¼ candles with benzol at 6d. per gallon . .	4·87
If enriched to 21¼ candles there would be an additional . .	1·50
Total	9·15

This is practically the maximum quantity we could admit into our gas at Airdrie; and when the quantity is reduced to one-third of the above, a further cost of 1·62d. per 1000 cubic feet would fall to be added, and the average for working (say) 300 days in the year would be about 10¼d. per 1000 cubic feet of gas manufactured. I have brought out the value at 21¼-candle power in order to compare with our former working under this quality of gas; and in giving below the working costs (in pence per 1000 cubic feet) of coal gas for the past three years, I would say that we should be safe in taking that of 1906-7 as a fair average year.

	1905-6.	1906-7.	1907-8
Coal	11·45	11·50	14·26
Benzol	0·89	0·92	1·37
Purifying material and wages .	0·16	0·35	0·07
Wages of stokers, &c. . . .	3·70	3·53	3·60
Cartage of refuse	0·21	0·12	0·06
Total	16·41	16·42	19·36
Less residuals	6·98	8·12	9·12
Net cost of gas	9·43	8·30	10 24

I have not taken into account capital charges for plant, buildings, and ground area. It would be interesting to obtain results from works where water-gas plant is in use on a large scale, placing a money-value on all points bearing on both methods—coal gas and water gas—such as ground area covered, structural costs, and holder accommodation.

NEW CARBONIZING SYSTEMS.

Indeed, the gas engineer of to-day who is face to face with the immediate extension of his carbonizing plant has a very difficult problem to solve, until experience brings out the relative monetary value of the differences between the respective systems in use. Honour is due to the memory of the late Mr. Love for his great labour in perfecting his 45° retorts, and also to Messrs. Woodall and Duckham for their ideal system of continuous carbonization. I had the pleasure recently of visiting the original plant at Bourne Valley, and the later type at Poole, in company with another gas engineer from this side of the Solway; and I have nothing but praise for the sweetness of the working. One could hardly conceive a system which could better reach our highest ideal than an extensive setting on these lines, heated (say) by producers erected on an adjacent site. I compliment Mr. Leather, of Burnley, on his having had the opportunity to put down the system on an extensive scale.

RETORT-HOUSE GOVERNORS.

A considerable number of retort-house governors have been fixed since last year; and as the users have not had an opportunity of expressing their views on the reliability and durability, those of us who have still the question under consideration would receive some confidence from a free expression on these points.

NAPHTHALENE TROUBLES.

The lowering of the standard of illuminating power in Scotland is bringing in its train this bogey of our Southern brethren; and it would be useful to prepare a remedy beforehand, on the principle that prevention is better than cure. But it is difficult to find what really is a remedy. Solvents seem to be the ultimate conclusion; but some time ago we heard of claims on this score for some of the tar extractors in the market. Information from the members who have found any traces of the trouble, and the cure in their own particular case, might assist us, who wish to kill the disease in the germ forming.

PURIFICATION BY OXIDE OF IRON.

I was interested a few days ago on coming across the report of the twenty-first half-yearly meeting of our "respected mither," the West of Scotland Association of Gas Managers, held in this

city in September, 1882, to read therein an informal discussion on the use of oxide of iron. From it I can only find five works where oxide was then in use—viz., Dundee, Greenock, Kilmarnock, Alexandria, and Old Kilpatrick—and in all these cases lime was also used. This number did not greatly increase, as, owing to the difficulties attendant on its manner of use at that time, oxide got a bad name as being dangerous, from firing and other causes; and as late as 1901 the numbers were still comparatively small. Since then, however, they have rapidly increased, and inquiries as to the best mode of working oxide, even from works making as little as 4 million cubic feet per annum, are being made, and the advantage to large midsummer resorts in keeping the boxes closed all summer, opening only in early spring and the late autumn, is one which keeps down to a very considerable extent the prejudice against gas-works. For works in Scotland making less than 10 millions per annum I would not recommend the exclusive use of oxide; but good results have been obtained by using two tiers of oxide and a top tier of lime. In works producing more than 10 millions, I would have no hesitation in using oxide alone, with revivification *in situ*. To get the best results, the air should be admitted in such manner that it can operate on the material which has already been sulphided; and this it will fail to do if there is sulphuretted hydrogen present in the gas along with the air. It is therefore necessary to absorb the greater portion at least of the sulphuretted hydrogen in a box of active oxide, and the air on passing on to the sulphided material in presence of the purer gas, will speedily revivify it. With the older system of working oxide, it did not pay, as a rule, to work material beyond 55 per cent. or so, as the labour in emptying and refilling greatly increased the cost. What the limit may be now, I am not yet able to say; but I am experimenting on this at present. One of our boxes filled in February for running on to October is loaded as follows: Bottom tier, with 51 per cent. sulphur; middle and top tiers, 57 per cent. All our testings are on the dry basis.

LIME PURIFICATION.

In small works with large purifying area, remarkable results may be obtained by the admission of a small percentage of air to the boxes. I know of one works with an annual make of less than 10 millions, and with four boxes, each 12 feet square, where a cover was not lifted for fully twelve months. The reaction I take to be as follows: $CaH_2O_2 + H_2S = CaSH_2O + H_2O$. The water formed absorbed the $CaSH_2O$, and kept the material in an open workable condition. This is only possible with very large boxes out of all proportion to the make of gas.

Discussion.

Mr. W. B. M'Lusky (Perth) thought all present would agree that the President's address had been a most interesting and practical one. Without attempting to institute comparisons, he believed it was an address which appealed to more of their number than any that had been delivered for many years past. He thought the President was to be complimented particularly on the survey he had made of non-consumers in Airdrie, especially as it had resulted in an increase of some 790 consumers of 9000 feet each per annum. This result was all the more gratifying when they considered that it had been realized without any capital expenditure. The only initial outlay was the installation; and this capitalized had cost but 4s. 6d. per annum to the consumer, who was called upon to pay it in addition to the ordinary fixed charges. Looking into their experiences of the large costs of making extensions, and how disappointing they were sometimes, they could understand what this meant. Here was a case where they induced some 790 consumers to come and burn gas off the existing plant. The President had mentioned power rates. In this respect he (Mr. M'Lusky) did not think, considering the part of the country in which the President was situated, that he had been very progressive, because compared with Alloa and other towns the 20 per cent. discount named was not enough. In his own remote part of the country, he found it necessary to give rates which were equivalent to 50 per cent. reduction on the ordinary rate. He had a sliding-scale beginning with 2s. 6d., and falling by 2d. per 1000 cubic feet of gas consumed to 1s. per 1000 cubic feet. They conformed with a clause which required that the rates should be the same to all persons in like circumstances. He did not understand how free cookers were allowed; and the objection which certain legal gentlemen in the country took to them was that their free distribution was not available to all classes of consumers. For instance, they were not wanted in offices. He himself believed in supplying cookers as cheaply as could be; and he had a nominal rate of 2s. per annum. With regard to fires, the President had had a peculiar experience, or otherwise he (the speaker) had, because out of 5700 gas appliances in Perth, only something like 3000 were cookers; the other half being divided between fires and small cooking-stoves. This was a large proportion of heating apparatus. The fires he did hire out were all of the very best class—majolica, in a great many instances—so that if a consumer wished to change, there was no damage when returned. He would like to ask the President what he meant by the statement, "the former conditions of gas-works labour."

The President: The explanation is this—that in one district trade might be very brisk, and you would have to advance the men perhaps 6d.; and when the boom was over the men would kick if you tried to take off the 6d.

Mr. M'Lusky thought the expression possibly referred to the old days, when the men saw fit to take half-a-day, or a whole day or a week, and wanted full pay. A good many of them had had this experience. As to sick allowances, he had a sliding-scale, whereby a twenty years' servant received three months' full pay, three months' half pay, and then six months' quarter pay; a ten years' servant had three months' half pay and three months' quarter pay; and so on, down the scale. Automatic controllers for street lighting had been mentioned in the address. He thought they had a very fine example of their working in Glasgow that foggy day. Of what value were they? They had to send out the lamplighters to light the lamps, because the automatic lighters would not do it. There was a good deal to be said in favour of pressure-actuated controllers. It would be interesting to hear from those who had experience what was the cost of these systems. He had another question to ask: Why did the President deny the managers of works producing less than 10 million cubic feet of gas the benefits of oxide of iron? He (Mr. M'Lusky) had a note of works making 4 million cubic feet, with small superficial area of purifiers, in which oxide of iron had been in use for five years, and the sulphur at present was 40 per cent.

Mr. A. Yuill (Dundee) said they looked upon the President's address at the Informal Meetings as giving them some debateable matter, together with the President's experiences from his own working; and he thought they all came there that day prepared to listen very attentively to what the President would have to say, more especially on the question of purification. They all knew the results he had had in purification with oxide of iron—in carrying on the work without requiring to open the boxes for a considerable period. This was a question which would be of benefit to them all; and the information the President gave ought to be profitable in their individual works. In the beginning of the address, the President gave them the debateable subject of corporation *v.* company ownership. On this question he did not say they were Socialists, but most of them had socialistic tendencies—that was to say, when they wished to satisfy themselves as to what was best suited for the whole town, he thought that those who had had experience of gas-works management in the hands of a company and in the hands of a corporation would admit that ultimately—and he used that word advisedly—there was no doubt that a works in the hands of a corporation was in the best interests of the consumers. Some of them had reason to know that, in the case of a company, when they found it convenient to increase their capital, the benefit went to the shareholders, and not to the consumers; but in the case of a corporation, while they might be paying a little larger sum at the beginning, they were repaying their indebtedness, and when they increased their capital the benefit ultimately went to the consumers. They were all at one with the President in the wrinkles he had given them as to the extension of business. He himself had found the introduction of free cookers to be a considerable benefit. In looking at this question, he possibly faced it from a different standpoint from others. In the works he had charge of, under a Corporation, he looked upon the subject somewhat from a socialistic point of view—he asked himself what was best suited to the consumers. No doubt meter-rents, charging for this, and charging for that, caused annoyance and worry to consumers; and the line he wished to go on, and intended to go on, was to give all the facilities he possibly could to consumers, and make one charge upon them, which was their gas-rent. It was found that the rental for gas-cookers came, on the total gas sold, to one-fifth of a penny per 1000 cubic feet. Therefore they had for years given gas-cookers free. In doing so, they were making a concession of only one-fifth of a penny. His experience had been that formerly they were troubled with cookers being returned. Many people wanted to have a cooker during the summer months; but as the winter approached, they sent to have it removed. When the summer came again, they saw they had made a mistake, but they were ashamed to go and ask for the return of the stove, and thereby a consumer was lost. Now he had thousands of cookers in use, and not more than about half-a-dozen in stock. Another point they saved by was in not requiring to have returned cookers cleaned up. They also saved in not having their capital lying idle. They saved a great deal more than if they were charging cooker-rents. Mr. M'Lusky was not able to take advantage of this on account of the terms of his Acts of Parliament; but in Dundee they were in a different position. There they had one who had the gift of foresight, and in their Act they had power to make, buy, sell, or "give" gas-cookers. The one word "give" covered them.

Mr. M'Lusky remarked that they had these words in their Bill; but unfortunately they went back to get more words put in, and they took that particular word out.

Mr. Yuill (resuming) said there were one or two other points he would like to mention. Automatic street lighting was a question that affected them individually. In a flat town, where the pressure was practically uniform, and they were able to give an increase of pressure as the evening approached, they would have an ideal condition for pressure controllers; but, in his case, with altitudes varying in every street, he found that they would be inoperative. They had a greater pressure in some districts in the day time than they had at night. He did not condemn pressure controllers, but said they were applicable to certain positions only. In reference to clock arrangements, they required to study these from a different standpoint. In Dundee, there were 5000 public lamps. It would cost about 30s. each to provide and fix the controllers. This meant £7500 of capital expenditure. Upon this they would have 3½ per cent. interest, and 2½ per cent. for sinking

fund; and if they added 10 per cent. for maintenance—clock arrangements were somewhat delicate—this was 16 per cent., which, on £7500, would amount to an annual charge of £600 over their present charge. He did not think he would be able to save the £600; and at the present time, when there was so much cry about non-employment, he would be a strong man who would say he was going to try to save by dismissing all the lamplighters. As one who had had experience of retort-house governors, he did not know that he was more thankful for anything than that he had introduced them. He had four 12-inch governors fixed, and had no trouble with them. They controlled the pressure to a uniform line; the variation of fluctuation in the hydraulic main being not more than $\frac{1}{10}$th during the twenty-four hours. There was no trouble with the exhaust. He had a little difficulty at the beginning from corrosion being set up by the hot gases. He introduced about 3 inches of oil, which floated on the top of the water; and in putting in water to maintain the level, it was run below the oil level. Then the overflow was taken off by the syphon, also below the oil level. The oil prevented corrosion; and it also helped them to maintain the liquid at its proper height. The governors were put in about eighteen months ago.

Mr. J. Napier Myers (Saltcoats) remarked that though they had a large programme in the address, he did not think there was anything in it which stirred either his strong sympathy or active opposition. It occurred to him as somewhat singular that both in the President of the day and the President of a year ago they had two of their most advanced students in chemistry and in engineering; and yet both of them had been tempted into the field of politics. Last year they had the question of the miners' strike and the coal-tax; and that day they had the question of individualist or collectivist control of gas-works. It had never been his experience to serve a corporation, except in a subordinate position. In his first list of figures, the President pointed out a difference in favour of company management of 4d. per 1000 cubic feet. Under one of the items—viz., rates and taxes—he put about 1d. per 1000 cubic feet. In his experience at Saltcoats, taxes were over 2d. per 1000 cubic feet; and he believed that his neighbours in Troon were over 3d. So that the experience the President had revealed showed him to be in very favourable circumstances in regard to rates and taxes. He had made a note of the subject of purification. He well remembered that last year they were told that, as the result of thirty years' experience, it was good policy to convey the gas downwards, instead of taking it, as was usual, upwards. He should very much like the President to give a moment's attention to this, and tell them what he would recommend.

Mr. S. B. Langlands (Glasgow) said Mr. M'Lusky had stated that clockwork controllers would be no use on a foggy day. He (the speaker) did not know whether Mr. M'Lusky had studied the subject, but he might mention that the clockwork controller was set in such a manner that it could be turned on from the street. The day of their meeting was an abnormal one in Glasgow, and they ought not to treat things normal as abnormal. They had about three such days in the year in Glasgow. They had not put away all their lamplighters. They had to keep on some for cleaning purposes, and they could be called in to light the lamps; but this would be only in the centre of the city. His idea was to make every man his own maintenance man, and make him responsible for his beat—for lamps, mantles, condition of burners, and condition of reflectors. Every lamp man in Glasgow had 118 lamps to keep right. There was a flying squad of inspectors, who went round every morning and reported to him. It was very much easier for a man to handle a clockwork controller than to have 118 lamps to light. He meant to make them tackle the cleaning of 240 lamps, because he found, in his wanderings, that double the number of lamps should be handled by a man, for cleaning, when he had not the lighting to do. This was a large question. It was easy to dismiss it by saying they did not like the system; but there was a good deal in it. They had 450 miles of streets in Glasgow, and the altitudes were very varying, giving great differences of pressure—from 15-10ths down to as low as 5-10ths. If they put on a pressure system, they would have an adjustment to make for every altitude, almost for every lamp. It might be thought that the adoption of the clockwork controller had been decided upon quickly; but, as a matter of fact, he had been testing clockwork controllers for two years. He had had them in the most trying positions, and, in the case of one of them, he had only once had to adjust a bye-pass. He thought this was a very good result. The President had spoken about hiring-out radiators. He (the speaker) wanted to give them a word of warning. There was a limit to the radiator. If they had perfect ventilation in a room, they might use radiators, but otherwise they should not do so. As to dangerous gasaliers, they would see that, if they had pressure control of the public lamps, water-sealed gasaliers might be very dangerous.

Mr. Thomas Wilson (Coatbridge) remarked that the President had given the meeting much subject-matter for discussion. He compared corporation with company management, taking a company paying a dividend of 5 per cent.; but they never had one which paid this dividend. The President would have been nearer the mark if he had taken 10 per cent., and 3½ per cent. for corporation borrowed money. If he had done this, and had added the redemption fund, it would not have amounted to 10 per cent. He thought the reason why corporations could not sell gas so cheaply as companies was that all the companies that were in operation before they were taken over existed for the mere purpose of earning dividends, irrespective of the cost of gas and of the maintenance of works. Corporations no sooner acquired such undertakings than they discovered that they had to remodel the works, or put down new ones, which meant doubling the capital. In purification, he had one box filled with lime, one with oxide, and another with lime and oxide. In his opinion, if they took into account the loss in illuminating power of the gas by cleaning with oxide, as compared with lime, they would find that the latter, as a whole, was as cheap a purifying agent as the former.

Provost Macfarlan, speaking of transfers of works from companies to corporations, said the question was really reduced to one of individual instances. If a corporation were made to pay an exorbitant sum for rickety works, it was quite understandable that the very first thing they had to do was just what Mr. Wilson had mentioned. He had been connected with the transfer of quite a number of works, and in Dumbarton they were exceedingly lucky in being among the first, if not the very first, to take over the gas-works. They did so by a Private Act of Parliament; and in their instance he had no hesitation in saying it had been a great boon to the community, because, for one thing, they got the concern at what might be called a fair price for compulsory purchase. No sooner had they obtained possession of the works than the population of the town commenced to increase; and from having a production of some 14 million cubic feet a year, they were now making about 90 millions. The Corporation had done pretty well; but no thanks were due to the Company, for they got their "pound of flesh" at the time. No doubt corporations were very apt to wobble for a year or two after they took into their hands such a new thing as a gas-works; and sometimes, if they had an exceedingly advanced engineer, he was very apt to tell them a great deal regarding what was required—and occasionally a little more than was really needed. After all, a transfer depended very much on the bargain made, and upon whether there were growth and elasticity in the community. No doubt in most instances—perhaps he should say in the great majority—the effect of acquisition by a corporation had been the benefit of the community, though they had had to pass through a period of trial. He congratulated the President upon not going beyond his depth. He kept pretty closely to what his own experiences had been, and to what he might fairly infer from them. He (Provost Macfarlan) would close with a few observations on the question of the staffing of gas-works. They could hardly help contemplating that troubles with workmen, instead of diminishing, were likely to go on increasing; and therefore it behoved everyone of them to look to the selection of the men for work. It had been his experience to have had some little trouble. At one time there was a trace of discontent, and he found that the man who was the ringleader in the affair was practically a pensioner in the works. This might be an exception; but there could be no doubt that the selection of capable and trustworthy men was a matter of the highest importance.

Mr. J. W. Napier (Alloa) said he should like to draw attention to a remark made by Mr. M'Lusky with regard to the powers which corporations had, working under the Burghs Gas Supply (Scotland) Act, in the matter of charging differential rates. He thought it ought to be made perfectly clear that the conductors of gas-works under the Act had a right to institute differential rates, because, taking a new interpretation of the clause to which he had occasion to refer quite recently, the deduction was made that all consumers in similar circumstances must be treated alike. Similarly with regard to those using cookers—they also must be put on the same basis. Therefore there should be no particular trouble with regard to gas-works operating under the Act. But there were cases, somewhat unfortunate, in which it had been found necessary to go to Parliament to get Special Acts; and in these cases there might be difficulty. He was not quite in agreement with the President about company *v.* corporation management. He was inclined to think that, in a matter of principle, having regard to the financing of corporation gas-works, a town council would eventually be able to sell gas much cheaper than a company. They had a sinking fund, which had the effect of lessening the first charge. If he took the case of Alloa, which was fortunate in having acquired the gas-works at an early period, he found that in the course of a very few years they would have to face a lower charge of fully £600 per annum. This was much a matter of finance. A company had no such liquidating taking place; and therefore his contention was that in this matter of the liquidation of capital a corporation stood to great advantage. He was very much in sympathy with the supply of free cookers, because where they instituted a differential rate to power consumers it might be argued that consumers using cookers who were also day consumers were entitled to consideration, which could be given by letting them have cookers free. In regard to differential rates for power purposes, he thought gas companies had not gone sufficiently far, because unless they instituted an exceedingly cheap rate, it was not possible to keep out suction gas. So far as Alloa was concerned, the matter was taken up at an early stage, and, on the basis of a differential charge from 2s. to 1s. 6d., they had been fortunate in keeping out suction gas. Recently a firm who generated electricity had determined upon coal gas as against suction gas. In his mind, this was ample evidence that suction gas had not a strong position where coal gas was sold at a specially cheap rate. In the matter of gas for power purposes, he considered that a differential rate was much more satisfactory than a definite one, such as obtained in some places, because the large consumer was the man who was most likely to go in for suction

gas, and therefore he was the most valuable to them, and, being so, was entitled to the best consideration. With reference to the possibility of men leaving their work without notice, it ought to be mentioned that the mere placarding of the extract from the Conspiracy and Protection of Property Act was not sufficient to prevent a stoker throwing up his work. It should be clearly understood that a separate agreement must be made between the employer and employee. With regard to the advantage of the use of retort-house governors, it had been his experience that the illuminating power of the gas had been kept so regular that it could be depended upon at all times to such an extent that they were practically stopping enriching.

Mr. G. R. Hislop (Paisley) said he was glad to find that the President was on the right lines with regard to free cookers and the charging of special rates for power and commercial purposes. He thought he himself was possibly the first in Scotland to adopt the free-cooker system; and he had had no reason to regret it. As he had mentioned before, for five-and-twenty years or more he worked very hard, with exhibitions and otherwise, to induce people to take cooking-stoves. At the end of that period, they only had about 700. He proposed to his Committee to introduce a new system, and now, at the end of five years, they had 5000 stoves and 3500 grillers; and still the progress being made was exceedingly good. He learned the other day that 150 were on order just now. A special rate was a subject which should receive the consideration of all gas managers, in order to induce people to use gas. In any case the fixed charges would be the same; and if they could increase their output, there was a direct saving. He never was favourable to the leasing out of fires, and he was a little doubtful of radiators, unless they were put in the proper place, where there was sufficient ventilation. He took very good care that he did not interfere with private enterprise. They sold nothing; and they did nothing which would interfere with tradesmen outside. They were sometimes confronted by some person who thought he had been aggrieved by a piece of work they had done—sometimes a trifling thing which their gas-fitters might have done; and with such warnings now and again, they did take care not to infringe upon other people's provinces. He started a number of years ago with the hiring-out of slot-meters; but, so far as Paisley was concerned, the movement had been a distinct failure. He had bought none for five years; and the number was steadily diminishing. He might state, as a substantial reason for non-success, that he only supplied these meters to single apartment houses. They managed to convince people occupying larger houses that it was a loss of money to pay more for gas, simply to have the privilege of putting a penny in the slot. The subject of dangerous gasaliers was one they could not entertain too seriously. In his own experience, he could mention many very narrow escapes of life owing to them. He had been in the habit of tying up gasaliers with copper wire; so that, if the weights did drop off, the gasalier was kept in position. If they could not be disconnected, this was the next best thing to do. But the day was not far distant when such gasaliers would be prohibited. His experience was that water gas was 2d. or 3d. per 1000 cubic feet dearer than coal gas. As they knew very well, he was a strong advocate of the use of both oxide of iron and lime for purification. He maintained that, in Scotland particularly, the amount of carbonic acid which they found in the gas was really too great to be utilized by enriching material; and down to the smallest works he invariably recommended both lime and oxide. They got most out of their product in this way—the oxide to take up the sulphuretted hydrogen, and the lime the carbonic acid. In England, where they seldom had more than 1½ per cent. of carbonic acid, it was not such a serious matter; but where they had 2½ per cent. or more of carbonic acid, it was, in his opinion, necessary that they should employ lime. The two materials should never be used together, but be placed in separate purifiers.

Mr. A. Mackay (Montrose) observed that he required to push his business against their electric friends, and in this connection he was thankful to the President for mentioning the subject of the extension of business. He introduced free cookers about September last, because at that time of the year cookers were being thrown back upon him—people saying that they did not want them during the winter months. When he went to Montrose he started gas-fires; but after two years' experience he had to discard them. With regard to the fitting of houses, he quite sympathized with what Mr. Hislop had said. It certainly interfered with local plumbers; but when they found these people canvassing for an electric company, they had to take up the matter of canvassing for themselves. About two months ago he started a scheme of piping houses, charging 4s. for every light—supplying piping, brackets, incandescent burners, mantles, and ordinary chimneys complete. It paid him to do this. The course he took was that, instead of making a survey, he took two streets at a time. He had up to this time only managed to get about six streets done; and he fancied that he had got 10 or 15 new consumers in that area.

The President, in closing the discussion, explained that, with reference to capital charges for extensions, they sought to recoup themselves to the extent of 4s. 6d. in five years; but they did not include in this the cost of the service or the meter. The cost of these was a capital charge against every consumer, which was recovered in the ordinary way—by the price of gas. He happened to be one who made a number of experiments in the matter of automatic lighting from a pressure-operated controller point of view; and when he told them that his patent expired a few months ago, and he did not renew it, they could understand his opinions about it. A pressure operator worked all very well in one room; but when they came to town distribution, it had not the ghost of a chance. The circumstances were too varying to admit of it being within the scope of practical politics. He denied the use of oxide to works of under 10 million cubic feet, for the reason that there was a slight falling off in illuminating power where oxide only was employed, and in a very small works the staff was not, usually, sufficient to cope with these variations in illuminating power. It required more attention than would pay; and therefore lime was more suitable in a small works. In the matter of free cookers, a point which swayed them was that the cost of changing from time to time practically swallowed up all the rental they got from the cookers; and they considered it was better to give them free, and let them stay out, rather than to collect money which they simply had to pay out as wages in the cost of removal and cleaning. He was very pleased to have had Mr. Yuill's opinion as to the use of retort-house governors; and many others who were considering the subject would also be glad to have this opinion. Mr. Myers was on the wrong tack in his references to rating. The rating he took was only the tax on their 1½ per cent. sinking fund—not their whole tax. If they were to take into account the whole rates, they would be as heavily handicapped as most people in the matter of rates. With reference to the hiring-out of radiators, he should like to mention that nearly all their radiators were put into halls or places where there was fairly good ventilation. In one or two cases people came and asked to have radiators put into bedrooms; but he told them he did not advise it, and that if they took them, it was at their own risk. The steam-heated radiator he could quite recommend for offices and halls; and it was for these purposes that he had been recommending them. As to his taking a company with a dividend of 5 per cent.—well, most companies who were paying 10 per cent. were looking about for some way of watering their capital and calling it 5 per cent. If they divided the capital by one-half and called it 10 per cent., they would find that the same figure dominated. He was surprised to hear anyone say that purification by lime was cheaper than by oxide. He did not advocate oxide alone if they had plenty of purifier capacity. If he had eight purifiers, he would not have oxide alone; but with four purifiers, he was quite prepared to face purification with oxide alone. With eight, he would use four with oxide, two with lime, and two afterwards, with oxide, as catch boxes. As to labour troubles, there was no doubt they would have to deal with the workman who knew all about every place except his own. It was not easy to "spot" who was the man; and when they did "spot" him, if the works were in the hands of a corporation, it was not easy to oust him. It was his view that corporations eventually had the benefit in the matter of the transfer of an undertaking. In seeking extension of business, he did not ignore the trade—he thought it well to keep it with him; and it was by a local tradesman competing and giving in prices for the work that he was able to undertake it so speedily and at such a low figure. He was a little surprised to hear that at Paisley slot meters were not a success, because his experience was that they could scarcely send out the meters fast enough. Perhaps one of the reasons was that they asked for deposits from all consumers of gas by ordinary meter; and people would not face this nowadays, when they could get a slot meter at very little more cost. What they gained most of all was in netting the paraffin oil consumers—people who were not likely to be consumers of gas unless they got it at a penny a time. He did not know that there was any other point upon which he could say anything. One subject he would like to have had fully discussed—one which was much before them at the present time—was that of distribution at high pressure. But there was not time; and he had only to thank the meeting for their patient hearing.

Next Year's President.

Mr. M'Lusky proposed Mr. J. Ballantyne, of Hamilton, as President of the Informal Meeting next year.

The President seconded the proposition; and it was unanimously agreed to.

Mr. Yuill proposed that Mr. M'Lusky be reappointed Convener of the meeting. This also was unanimously agreed to, and Mr. M'Lusky accepted office.

The managers and their friends, to the number of more than a hundred, subsequently dined together in the hotel—Mr. Vass in the chair. The toast of "The King" was the only one that was proposed; the after proceedings being devoted entirely to music and recitations.

Eastern Counties Gas Managers' Association.—The spring meeting of the Association is fixed for the 21st inst., at Stamford. The programme includes two papers—"Gas Practice at Great Yarmouth," by Mr. W. J. Carpenter; and "Tar for Roads, Drives, Yards, Garden Paths, &c.," by Mr. J. H. Troughton. For the following day a visit has been arranged to the fire-clay works of Messrs. Williamson Cliff, Limited; and should time permit, there will be a drive through the grounds of Burghley House, the seat of the Marquis of Exeter.

MIDLAND JUNIOR GAS ASSOCIATION.

Visit to the Round Oak Steel Works.

On the invitation of Mr. George Hatton, Managing-Director of the Earl of Dudley's Round Oak Iron and Steel Works, Limited, Brierley Hill, about fifty members of the Association paid a visit to the works last Tuesday evening.

The Round Oak works comprise blast-furnaces and accessory plant for the production of pig iron from iron ore; puddling furnaces and rolling mills for the conversion of pig iron into puddled bars and finished wrought-iron sections; and works for the manufacture of chain and cables; steel works of large capacity, and equipped throughout with the most improved and up-to-date plant for producing finished steel sections by the Siemens-Martin basic open-hearth process. In addition to these various works, the Earl of Dudley also owns a considerable number of coal, iron ore, and fire-clay mines in the immediate neighbourhood; but the time at the disposal of the visitors was short, and attention had therefore to be directed to the steel works alone. Mr. Howard, the Chief Chemist, and his assistant conducted the party round; the metal mixing plant being first inspected. This consists of a huge horizontally fixed barrel-shaped gas-fired furnace, capable of circumferential movement by hydraulic power. The pig iron received from the blast-furnace is melted on the hearth, and motion given to the furnace, with the result that the various classes of pig iron are thoroughly mixed, and also the amount of carbon silicon and sulphur in the metal is materially reduced.

The Siemens furnace was next visited; and there the operation of charging a furnace was watched with great interest. The pig iron, scrap, oxide of iron, and limestone forming the charge were contained in iron boxes on waggons; and these were brought up to the furnace-mouth by an electric charging machine. The ram of this machine engaged in the box holding the charge, lifted, and carried it into the furnace, and deposited the material on the hearth by turning partly to the right and then to the left, in a somewhat similar manner to the action of the scoop in a West's charging machine. While this was going on, a huge ladle of molten metal had been brought up from the mixer previously described; and by the aid of a powerful crane, the ladle was lifted and the metal emptied on to the furnace hearth.

Attention was then directed to the tapping of a furnace. The ladle for receiving the molten steel was carefully dried by fires, as it was explained that the slightest dampness in the ladle lining would produce an explosion, and cause the metal to fly in all directions. The steel, on being tapped, ran out in a stream, and in so doing gave a pyrotechnic display of extraordinary brilliance. The slag, by virtue of its specific gravity, rose to the top, and, as the ladle gradually filled, overflowed into an adjacent bosh. The ladle was then moved over the top of the ingot moulds, and each mould filled. The ingots were then stoppered by throwing sand on the surface of the metal, and an iron plate was wedged tightly on the top of the sand. When the metal was sufficiently set, the moulds were stripped; and the ingots would be taken as required to the soaking pits, where they are heated to the required temperature for rolling, and thence to the mills, where they finally emerge as finished sections.

During the interval between the charging of the one furnace and the tapping of the other, the chemists of the party were interested in the description given of the methods adopted in analyzing the steel. A fairly accurate analysis of the chemical composition of steel is required before each furnace is tapped; and as this is made in about 25 minutes, it was evident something was to be learned in the way of rapid methods of analysis. The chemical reactions taking place on the furnace-hearth, whereby the carbon, sulphur, silicon, phosphorous, and manganese in the charge are eliminated, were explained and discussed, as well as the method of re-carbonization by adding red hot ferro-manganese to the molten metal as the ladle fills.

The producer gas plant was examined and the Siemens' regenerative system explained. In this system, two separate and distinct regenerators are used; and these are large chambers filled with open fire-brick chequerwork. The waste gases from the furnace-hearth on their way to the chimney are made to pass through one of these, with the result that some of the heat from the waste gases is absorbed by the fire-brick lining, and the temperature of the brickwork is raised. The travel of the gases is now reversed. The waste gases are taken through the other regenerator while the secondary air and producer gas travel in an opposite direction, over the heated brickwork of the first regenerator, which in turn gives up its heat to these gases.

Very little time was now left to examine the other portions of the plant, such as the boilers, electrical and hydraulic machinery, rolling-mills, testing apparatus, &c. A hasty glance at these on the way out only served to emphasize the regret that a thorough inspection could not be made.

Though the manufacture of steel is, of course, only of general interest to gas engineers, yet it was admitted on all hands that the visit had proved most profitable and instructive; and Mr. Hatton's kindness in affording the members the opportunity was suitably acknowledged.

Mr. John Nicholls, the Manager of the Crewkerne Gas-Works, died last Tuesday, after a brief illness. He was well known and highly esteemed in the town.

BUYING COAL ON ITS CALORIFIC VALUE.

Among the large purchasers of coal who make their contracts on the basis of the number of thermal units in the fuel delivered is the Municipal Traction Company of Cleveland. At a recent meeting of the Cleveland Section of the American Institute of Electrical Engineers, Mr. L. P. Crecilius, the Company's Superintendent of Power, described the methods followed in making these purchases. The following particulars in regard to the matter are reproduced from "Engineering Record."

There are now available in the Cleveland market in extensive quantities two principal grades of bituminous slack—one coming from the western section of Pennsylvania, and the other from the eastern part of Ohio—the better of which is known as Youghiogheny gas slack. For a period of about two months before the contract was put into effect, the Company made certain evaporative tests to determine the relative steam-making qualities of Ohio bituminous slack and Youghiogheny gas slack. These tests clearly indicated that with the furnaces as constructed, and the draught available, both slacks could be burned with equally good results. The average chemical properties of the two kinds, per pound of dry coal, are as follows:—

	Youghiogheny Gas Slack.		Ohio Bituminous Slack.
British thermal units	13,185	..	12,614
Ash . . . . . p. ct.	11·60	..	13·80
Sulphur. . . . . ,,	2·03	..	3·53
Volatile combustible matter ,,	31·95	..	36·62
Fixed carbon . . . . . ,,	53·52	..	45·55

The relative evaporation per pound of coal as fired was 7 per cent. in favour of the Youghiogheny gas slack. The inherent moisture contained in the coal in the first case is 1·52 per cent., and in the second case 2·7 per cent.

Each day's consignment of coal furnished to each power plant by the contractor during the continuation of the contract is sampled by the superintendent or his authorized agent, and analyzed to determine its heating value. The price paid by the Company per ton per car of coal is based on a table of heat value for excess or deficiency of the standard contained in the contract, but subject to further deductions for ash and sulphur.

A small quantity of coal is taken from at least five different places in each car received, by driving into the coal a 5-feet ram, before the car is unloaded. The quantities thus received from each car of coal of the day's consignment are thrown into a receptacle provided for the purpose and thoroughly mixed, and a properly selected sample of the mixture is taken for chemical analysis. Half the sample of the average mixture is labelled and held at the Company's laboratory for a period of two weeks after unloading the cars. The other half is analyzed as soon as possible after being taken. No other sample is recognized.

Tests of the sample taken from the average mixture are made by the Company's Chemist under the supervision of the Superintendent. Should the contractor question the results of the test (a copy of which is despatched to him), the Company will, if requested within three days after the copy has been sent to him), forward the other half of the sample to any laboratory in Cleveland which may be agreed upon, and have it analyzed there. The results obtained from the second test are considered to be final and conclusive. In case the disputed values as obtained in the Company's test are found by the second test to be 2 per cent. or less in error, the cost of the second test is borne by the contractor; but if the disputed value is found to be more than 2 per cent. the cost is borne by the Company. Should no question be raised within the three days specified, the second sample of coal is destroyed at the end of two weeks from the date of unloading the cars from which it was taken. Should a second test be made of the sample of the average mixture, any penalties to be made will be based on the results as obtained from the second test.

Coal which is shown by analysis to contain less than 15 per cent. of ash and 3·5 per cent. of sulphur is accepted without any deduction from the basic contract price, *plus* or *minus* an amount of excess or deficiency of B.Th.U. value. Where the analysis gives amounts in excess of these quantities, deductions are made from the basic contract price in accordance with the penalties provided in the contract, *plus* or *minus* the amount for excess or deficiency of the standard value.

The table of penalties is so proportioned as to focus the attention of the dealer to supplying Ohio bituminous slack of a value ranging from 12,500 B.Th.U., the standard in the contract, to 13,125 B.Th.U., 5 per cent. above the standard, which results to him in the best profit obtainable. To have protection against the supply of fuel which, though having a high calorific value, may, by reason of its chemical composition, not be entirely adapted to the stoker equipment, a limit has been placed in the table above which no further premiums are paid. Almost immediately after the contract came into force, there was a marked difference in the cost of efficiency of the entire plant, accompanied by an improvement of some 8 per cent. in the consumption of coal per kilowatt-hour.

The conclusions arrived at were: (1) That the installation of the scheme of purchasing fuel on the B.Th.U. value basis has been justified in this case. (2) That, due to the difference in price as existing between Youghiogheny gas slack and Ohio bituminous slack, the latter is the cheaper fuel to use—admitting, however, the superiority of the former over the latter.

COMMERCIALISM IN THE GAS BUSINESS.

By PHILMER EVES, of Indianapolis.

[Extracts from a Paper read before the Indiana Gas Association.]

"Commercialism" may be defined as the adoption of profitable and legitimate means to advance business interests. This precludes the escape of the technical gas man from participation in a general interest in the selling question—the commercial side of the gas business. In all business, whether competitive or unopposed, it is policy to produce the finest goods for the money, and to deliver the goods by as pleasant and acceptable a system as can possibly be devised. Too little is sometimes allowed for the beneficial effect of a satisfied and contented community. Here the gas manager or the gas superintendent and the distribution officials get in some of their best work, and pave the path, the "nearer way," to the goodwill and patronage of the public. It is an inspiration to associate commercially with an intelligent and up-to-date manager, who is wise to insist in all his departments on courtesy and the square deal.

A polite affability on the part of the street foreman and the meter inspector is one of the most valuable assets of a gas company; while a stubborn foreman or an uncivil meter reader could make business development difficult, if not impossible. And while the public are perhaps smarting under the effect of a dull year of trade, and feeling somewhat unapproachable, and especially where competition or probable competition propagates prejudice and unsettles the mind of the public, it is well for the sales manager and the officials of the contract departments to give all the assistance possible to the outdoor foreman, by seeing that the preliminary and necessary information, as well as the proper consent, has been previously secured.

The commercial or sales department has two distinct and inseparable duties to perform—first, to sell gas and gas appliances; second, to see that the fullest and most economical use is made of both the gas and the appliance. This selling of gas and appliances is being accomplished by many methods, and no two gas companies can adopt exactly the same system in every detail. But a general system, bringing perhaps the best results, is that afforded by the card census, which, though occasioning considerable expense and labour to instal, has proved to be productive of gains in appliance sales and gas output. This system is in operation in Indianapolis. The advantage of the card information, when once obtained, is in enabling the salesmen or canvassers to see the possibility for likely business when making their calls. The actual conditions are known, and much time is saved in ascertaining these conditions on each visit; while the classifications of the cards will simplify and specialize the advertising literature delivered at each call.

Residents and business men who are not using gas at all should receive the most persistent attention, and they occasion, through their inexperience, the most careful handling. Once get them to use gas, and to use it intelligently, and the other sales will naturally follow. The people most easily persuaded are those who use gas for lighting, but have not yet bought cooking and water-heating appliances. They know from public opinion the value of the gas-range and the water-heater; and it is only a question of constant persuasive effort to bring them up to the more advanced classification. After they have reached this higher class, it is surprising what may be done in the way of getting them to increase the aggregate gas sales. It is among this class of patrons that the largest number of orders are secured for the sundries, which all count, such as the iron-heater, the toaster, the domestic gas-iron, the cake-griddle, and many other appliances that are helpful to the consumer and a source of additional income to the gas company.

The question of the employment and payment of canvassers has always brought out a variety of opinions. What pays in one place may not be the best paying system in another. Payment of commission appears to risk having the largest number of worthless sales and losses; while the straight-salary plan is equally inadvisable in the opposite direction. The combination found to possess the smallest number of objections appears to be salary and prizes, with an increase of pay to the best men—the prize winners. This method stimulates the personal interest, creates, by fair competition, a desire to win, and affords the best means of displaying the comparative worth of each man for the weekly inspection of all.

The question of the commercial department's policy of selling gas appliances on a profit-bearing basis, as against selling at cost or at a loss, has been so often discussed, and the opinions on this question are so diverse, that it may not be productive of much profit if attention is invited to the point again. It may, however, be said advisedly that the opinion seems to be growing in favour of considering that the time has gone by when gas companies can afford to put out appliances at or below cost. The general expenses of operating the appliance department and the warehouse or storeroom, the reasonable and unreasonable demands of gas consumers, the necessity of subsequent inspections of appliances sold, the cost advisedly incurred in giving instruction to patrons, the expense of appliance repairs, and the attention which must be given to troubles arising from the misuse of appliances, to say nothing of the cost of connecting the appliances and of advertising literature and soliciting, are all too well known to warrant the putting out of goods without some margin of profit to partly defray this large maintenance cost.

The argument, which I admit is a strong one, that an increased sale of gas results from minimizing the selling cost of appliances, is somewhat weakened or counteracted by the comparatively new method of adopting selling prices that will encourage outside dealers and local agents to handle gas-ranges and other gas-consuming goods. This practice has proved satisfactory, not only on account of the additional co-operation secured in the efforts to put out the appliances, but in bringing in some business which probably might not be reached by the gas company's efforts alone. The danger or objection to this plan, if there be any at all, arises from the competition giving rise to exaggerated statements by the dealers and their assistants, who, of course, are not gas men, and who are not greatly interested in the customer after the goods have been sold and delivered. And, allowing for the dealer's strenuous efforts to sell his own goods, it is difficult to check the tendency to injure the reputation of the ranges sold by the gas company. The cost of connecting, free of charge, the ranges sold by these outside dealers, also counts against the plan, because the dealers, and not the gas company, get the profits. But, on the whole, it is considered that the dealers assist the aggregate output of ranges and some other gas appliances.

The policy of selling on the "easy payment" plan is almost universally favoured. By securing a controlling interest in the appliance, by means of the contract card, on "lease," as it is sometimes called, there is very little chance of loss of the appliance or loss through bad debts. Going back over a long period for data on this point, it has been found in Indianapolis that upwards of 200 gas-ranges were brought back and resold, and that the average amount received in instalments on these forfeited ranges was almost equal to the difference between the selling value of the second-hand ranges and new ones; so that the actual loss by the credit or monthly payment system is surprisingly small, especially where close watchfulness is exercised in the collection department.

Of the gas-ranges sold in Indianapolis during the past year, 73 per cent. were sold on the monthly payment plan, and only 27 per cent. of the purchasers paid cash. Industrial appliances and gas-engines, which, of course, represent larger sums of money, are put out on the contract or leasing plan; and this plan has rarely been found either a losing system or to have failed to secure acceptable industrial business. The water front in the kitchen heater is also in line with the gas company's efforts to give gas consumers a winter supply of hot water, so that the necessity of a coal-range for this purpose may no longer be raised or offered as an objection to the use of the gas-range all the year round.

The business outlook is now more encouraging. The demand of property owners for gas extensions shows that the value of gas and of having buildings piped for gas is becoming more understood and appreciated; and it is a fact that few people nowadays will rent a house that is not equipped for gas. The landlords also recognize the additional advantage in the use of gas-ranges throughout the year in the saving of cellar space and in the prevention of dust and damage to property arising from the use of hard fuel. The development of lighting appliances in the way of artistic adaptation, design, efficiency, and economy has received more universal and successful attention during the past year than ever before. Even this helpful advance may not be wholly the effect of commercial competition, but may be partly attributable to the greater effort put forth in the quieter times of business depression.

Gas appliances for cooking have been advocated for so long a time that the gas companies' territories have now been fairly well supplied. The chances for the sale of gas-ranges and other cooking devices are becoming comparatively smaller every year, and while the extension of gas-mains and the acquisition of new consumers along older mains may continue uninterruptedly to some extent, and while older ranges will be replaced by others of newer styles, the bulk of the harvest in this direction has been gathered.

At this opportune epoch there comes along the kitchen heater or coke attachment, whose welcome appearance has given rise to the almost universal remark: "Why was this necessary and extremely useful friend of the gas company and the gas-using public not introduced before?" Gas consumers can now be induced to use the gas-range throughout the winter, when without the kitchen heater the use of gas for cooking would be discontinued until warmer weather made the gas-range again an absolute necessity. It is, of course, well known that numbers of gas consumers have always cooked with gas throughout the year; but a large percentage in most towns have gone back to the coal-stove during the colder weather.

The steps hitherto taken in Indianapolis and other places to keep the gas-range in use all the year have resulted in a considerable increase in winter gas consumption. The visits and advice of the instructor or demonstrator have been valuable in this respect; and the diminution in the number of customers who request the temporary disconnection of the gas-range shows that the public are now becoming educated in this respect. But the kitchen heater is the more wholesale preventative of winter loss of gas sales; and it is acceptable alike to gas companies and the gas-using public.

Attention must be paid to the cooking classes at the public schools and the hospitals. The school classes are, as a rule,

presided over by competent graduates of domestic science universities and colleges; but it behoves the representatives of gas companies to visit the classes occasionally, in order to help the teachers to keep pace with improved gas appliances. It is found that suggestions along these lines are generally acceptable.

The Indianapolis Gas Company's cooking classes at the hospitals are welcomed by the authorities and the trained nurses. The nurses are instructed in the art of cooking a number of dishes suitable for the sick. Gas-ranges are used in this work—thus qualifying the pupils to use them intelligently when engaged as trained nurses in the city. The Gas Company's demonstrator is available to conduct these hospital classes. It has been found that the classes are frequently visited by medical men and friends of the hospital, which secures added goodwill for the Company and a valuable sentiment in favour of gas for cooking.

Undoubtedly the best-paying expenditure of time and money along domestic lines is that which provides the woman demonstrator—the "Gas Company's Cook"—all the year round for instruction work. Cooking demonstrations in the office, which she conducts, on busy days, are a means of advertising the advantages of the gas-range, and of assisting and instructing customers who experience trouble in getting the best results. Her visit to the home of every purchaser of a gas-range puts the novice on the right track, secures the fullest use of the range, and thus increases the aggregate gas sales. The printed list of all the dishes that may be broiled and baked in the two ovens of the gas-range, by utilizing the heat generated, and the quantity of gas that may be economized or saved to the consumer in this way, may apparently cut down the gas sales in the individual case; but the good effect gains the goodwill of the consumer, adds to the popularity of the gas-range, and will account for an increase eventually.

The cooking lectures which have been given in Indianapolis during the past few years, in connection with the churches, have been very popular and well attended. They have reached the largest number of interested women at the smallest cost. The cost of the hire of halls and other expenses have been saved. The advertising cost has been minimized, and considerable advantage has come to the Gas Company by the announcement of the meetings from the pulpit and in the schools. At nineteen of these church lectures, held in one month alone, the total attendance was 2796, or an average of 141.

The co-operation of plumbers and gas-fitters is an important asset. House piping must not be overlooked in the effort to gain additional consumption of gas. An amiable arrangement has been made in Indianapolis whereby the gas-fitters are brought into harmony with the Gas Company's objects. A uniform price of 20 c. per foot has been established for house piping. Orders obtained by the Gas Company are forwarded for execution to the various gas-fitters of the city, who in turn report to the Company all house-piping work secured by its own efforts. This mutual co-operation brings with it the friendliness of the plumbers and the additional gas appliance business which their influence secures. It keeps the card census up to date, and enables the canvassers to follow up the prospect for further sales.

The instantaneous automatic water-heater is becoming better known and appreciated, and furnishes hot water in homes and business houses that would not be adequately supplied from an ordinary small tank heater; while the tank heater itself is being more universally adopted in homes and business places.

Heating by gas has made some short steps in the right direction. Hitherto it has not been claimed by any experienced gas man that gas is practical and economical for the exclusive heating of residences or other buildings; but with the advent of the gas-steam radiator some business may be secured, to the mutual advantage of the user and the seller of gas. This radiator has been installed to heat one of the largest schools of Indianapolis; and as the sessions extend over only five hours of each day, gas-steam heat is found more economical than to pay for an engineer and hard fuel to run the boiler. Other buildings, such as lodge-rooms, churches, and similar places, where only occasional meetings are held, or where supplementary heat is needed, can be economically heated by gas.

Gas companies are now giving more serious attention to the industrial field, and it is in gas appliances using gas for industrial heat or power that the gas industry must turn for most of its future business development. Gas-engines are being perfected and brought up to guaranteed economy. Manufacturers of gas appliances and gas men themselves are inventing burners and contrivances to meet practically every industrial requirement.

One of the best methods of keeping up with the development of industrial appliances, and of influencing this branch of a gas company's business, is to procure the latest catalogues and descriptive literature, and to watch the advertisements in various newspapers and gas publications. The latter are now devoting more editorial and descriptive space than ever before to this fast-growing and all-important problem, and publishing reports of experience and experiments. The industrial gas business is yet in its infancy; and where the extension of sales is a question of education and demonstration, it is advisable as well as necessary to find out what gas appliances can supplant the more primitive devices, and offer to instal the modern apparatus on trial. This method of granting a reasonable trial removes the obstacles of ignorance and incredulity, and, in most cases, nets a profitable patron. Difficulties arise from the workman's prejudice, careless manipulation, or want of proper pipe connections or air supply in appliances procured without the intervention of the gas company. To overcome these drawbacks, the gas company's expert mechanic must visit the appliances regularly during the period of experiment, and give the necessary information and advice to the owner of the industry, as well as personal assistance to the machine men or the engineer.

In conclusion, we may say advisedly that, with good gas, the best lighting, cooking, heating, and power appliances, and the determination of the appliance makers to keep ahead of the times, commercialism in the gas business will mean more and more as time goes on.

BOGHEAD CANNEL EXHIBITED AND DESCRIBED.

At the Meeting of the London Section of the Society of Chemical Industry held at Burlington House on Monday of last week, Mr. Watson-Smith exhibited a specimen of the "now extinct Boghead cannel coal" or "Torbanehill Mineral."

At the request of the Chairman (Mr. E. Grant Hooper), Mr. Watson-Smith gave a brief historic and chemical description of the mineral, of which the fine specimen exhibited had been presented to him by the late Dr. Percy. He referred first to the litigation in the Edinburgh Courts, in the year 1853, between the lessors and lessee of the property on which the mineral was found, as to whether or no it was a coal. The right of the lessee to work it depended on whether it was comprised under the term "coal;" and though it was undoubtedly on sale as a gas coal, it was nevertheless contended that it was not a coal but a bituminous schist. Many scientific witnesses were called and asked to define what they understood by coal; but the Judge, in summing up, recommended the Jury to disregard the confusing and conflicting definitions thus tendered by the scientists, and to consider whether the mineral was coal in the ordinary language of those who usually trafficked in it, and in the acceptation of business transaction. The Jury decided that the mineral was coal—thus confirming the opinion held by A. W. Hoffmann, Thomas Graham, J. Stenhouse, Edward Frankland, and a number of other eminent chemists of the day.

A contrary decision, however, was given by the German Customs Official Court in Berlin, when the question was raised as to whether Boghead cannel could be imported into Germany free of the duty which was levied on importations of bituminous gas coal. The Boghead cannel was being imported by one of the two competing Gas Companies at Frankfort-on-the-Maine—the one Company making coal gas and the other gas from resin, fat, &c. The Customs Court decided that the mineral was not a coal, but merely a bituminous substance. The arguments adduced by the scientific witnesses turned very much on the question whether, on distillation, the mineral yielded benzene, the formation of which was then believed to be characteristic of coal. On the other hand, the large percentage of ash in the Boghead mineral was quoted in support of the bituminous schist classification. Even the classical definition of coal given by Dr. Percy, under which Boghead or similar schist would be excluded from the category of coal because of its large content of incombustible matter, would, however, Mr. Watson-Smith pointed out, fail if applied to more recent discoveries, such as Japanese Müke coal, which is now always regarded in commerce as a coal.

Boghead cannel was found in position not different from that of coal; and was won in rhomboidal blocks. It afforded on gas-works 3000 cubic feet more gas per ton than other cannels, and the gas was of higher quality. A somewhat similar cannel had since been worked at Breckenridge, in Virginia; and a specimen of this was also shown by Mr. Watson-Smith. The various cannels, &c., were distinguished by the proportion of their contents which was dissolved by benzene. This rose from 0·6 per cent. for Boghead to 1·06 per cent. for Breckenridge and Wigan, and 9·5 per cent. for Japanese Müke coal. The Boghead mineral ignited readily, burnt with a white smoky flame; split and cracked in burning, without intumescing; and yielded on the average 21 per cent. of ash. Its specific gravity was 1·15 to 1·21. It yielded 31·7 per cent. of coke, which consisted of 33·4 parts per cent. of carbon and hydrogen and 66·6 parts of ash.

At the close of Mr. Watson-Smith's remarks, Mr. Oscar Guttmann observed that, in the Siege of Paris, the French used the ashes of Boghead cannel as a substitute for kieselguhr in the preparation of dynamite.

Analysis of the Accounts of Water Undertakings.—It will be seen, from an announcement which appears elsewhere, that the annual analysis of the accounts of the Metropolitan Water Board and of some of the principal water undertakings of the United Kingdom, which is compiled by Messrs. Wood, Drew, and Co., of Queen Street, E.C., is now ready. The accounts of the Water Board dealt with are those for the year ending March 31, 1908, and, for purposes of comparison, an analysis is given of those of the Metropolitan Water Companies (including the Staines Reservoirs Joint Committee) for 1903-4, the final year of their existence. In the other cases, the accounts taken are for 1907-8, and the analysis is presented in practically the same form as for the preceding year, but with a few alterations in the setting-out of the tables. This is the twenty-eighth year of publication of the book, and its characteristics are too well known to call for special notice. It is published at the office of the "JOURNAL," and the price is 15s.

CALORIMETRIC CONTROL OF FUEL CONSUMPTION

In the notice of the Smoke Abatement Exhibition at Sheffield which appeared in the "JOURNAL" for the 9th ult., it was mentioned that conferences of manufacturers and local authorities were to be held to discuss questions bearing upon the production and prevention of smoke. A conference of local authorities took place the previous day, when Dr. R. Lessing, F.C.S., read a paper on "The Calorimetric Control of the Supply and Consumption of Fuel."

The author began by recognizing the success which has of late years attended the various smoke abatement organizations in fighting the great evil of smoke production, though they had, he said, been strenuously opposed by prejudice and ignorance. Unfortunately, the manufacturer, and generally the coal consumer, looked upon the production of smoke as a welcome sign of industrial prosperity; and far from acknowledging the existence of a "nuisance" arising from it, he regarded rather in this light the societies and their executives who worked to abate it, on account of the prosecutions he had to fear from them, and which added to his already numerous worries. He (Dr. Lessing) thought there would be a possibility of bridging over the gulf separating the negligent coal consumer and the exponent of the right to a pure atmosphere, as soon as it was brought home to the manufacturer that it would be to his own financial interest to prevent black smoke issuing from his chimney-stack. The fact that a good deal of valuable carbon lost as smoke could be saved, was correct as far as it went; but in attempting to effect a saving, there was great danger of encountering an economic loss in the opposite direction. In order to make this point quite clear to his audience, the author proceeded to explain the scientific principles of combustion.

Dr. Lessing then, at some length, dwelt upon the advantages of proper methods of controlling the combustion of coal, and pointed out that the laws of chemical combination permit us to conclude, from the composition and temperature of flue gases, how efficiently the process of combustion is being conducted. He went on to show that the analysis of flue gases is a very simple operation which can be carried out by any man or boy possessed of some manipulative skill, after due instruction and under the control of the trained chemist or engineer, using the ordinary apparatus for gas analysis. But even this little trouble could, he said, be dispensed with; for there are now on the market a number of very reliable and fairly accurate instruments which automatically analyze the gases—thus eliminating the human element altogether. Most of them are fitted with recording devices noting on a chart the percentages of carbon dioxide (and some also those of oxygen) contained in the gas. By this means the superintending engineer could easily find out, by the oscillations of the curve produced, whether or not his stokers were exercising due care in tending the fires. Dr. Lessing stated that in all cases which had come under his notice, the installation of such appliances had been followed almost immediately by a more regular fire practice, more especially during night shifts, which seemed to produce almost invariably a less continuous curve during the first period of the working of the apparatus, until the men became wide awake to the fatal accuracy of the method. In every instance, careful supervision in this direction was accompanied by considerable economies in the consumption of coal; and control on these lines with a device of any description, provided it worked with a certain degree of accuracy, commended itself highly to any steam user.

The author next turned his attention to the question of fuel supply, and emphasized the necessity for some steps being taken in the direction of its control. He said the great majority of coal consumers, though possibly recognizing the existence of "good coal" and "bad coal," were, to say the least, indifferent to a valuation of their source of thermal energy on a scientifically sound basis. They purchased their coal on the statement of quality by their coal merchant or factor, or on the reputation of the mine or district whence it was obtained; and in most cases no specification whatever was asked for or furnished. Since fuel was used for its thermal value only, it was most important to obtain information on the point.

Dr. Lessing went on to say that methods of determining the calorific value of combustibles had been worked out in great variety. The best and most accurate calorimeter was undoubtedly the bomb calorimeter, originally proposed by Berthelot, the great French chemist, and improved by various workers—such as Mahler, Donkin, and Cook. The modification known as the Mahler-Kroeker type was considered the most accurate (though expensive) instrument of to-day. He gave the following particulars in regard to it: It consists of a closed bomb or cylinder, in which the combustion takes place in a constant volume. The bomb is made of mild steel, and is platinum lined or inside enamelled with an acid-resisting composition; for, under the pressure employed—viz., 25 atmospheres of oxygen—the nitrogen contained in the fuel is converted into nitric acid, which would corrode the unprotected steel. The cover of the bomb screws down on leaden joints; while two tubes in the cover serve for the admission of oxygen from a steel cylinder. A gauge allows the pressure to be read when filling. One gramme of the coal sample is placed in a porcelain or platinum cup, into which dips an iron wire connected to the circuit of an electric battery. The bomb is placed in the calorimeter vessel (which contains about 2·25 litres of water), the walls of which are suitably insulated against radiation. The calorimeter water can be agitated by a stirring arrangement. On closing the current, the iron wire is raised to incandescence and ignites the fuel, which burns completely in the atmosphere of compressed oxygen. The heat is imparted to the water; and knowing the thermal capacity of the bomb and the actual weight of water employed, the maximum rise in temperature observed by means of a very delicate thermometer graduated in one-hundredth degrees, gives a value from which the calorific value of the fuel under test can be calculated, by a standard formula, and after due consideration of certain corrections to be made. The method has been brought to a degree of perfection which allows the error in two or more experiments on the same sample to be restricted to as little as 10 B.Th.U. A method which gives results of such accuracy—it corresponds to an error of only about 0·1 per cent. or less—deserves to be made use of to the largest possible extent. It not only is accurate, but it gives us a correct picture of exactly that factor for which we employ coal or other fuels—namely, the heat value.

The author pointed out that other countries are fully alive to the importance of this question of rational fuel analysis. In the United States, fuel experts have gone so far as to propound a scheme according to which coal is not to be sold by weight, but simply by its calorific value; making the number of B.Th.U. it contains the basis on which price and payment are regulated. This is perhaps an extreme case, as a lot depends on all the other factors making for the distinctive character of a coal.

The method now adopted by the United States Government, proceeded Dr. Lessing, although not quite so extreme in its principle, certainly deserves mention. As the result of a letter from President Roosevelt to the National Advisory Board on Fuels and Structural Materials, calling attention to the need of a uniform and efficient basis for the purchase of the Government fuel supply, a specification was drafted and approved by the Board for the fuel supply of all Government offices and buildings. The principal point of this specification is the requirement of a certain standard of coal as regards all its constituents and heating value. These have to keep within certain specified limits, beyond which the cargo is rejected. Within these fairly wide limits, a sliding-scale regulates the price according to the heating value and ash contents of the dry coal. For example, for every 2 per cent. more or less B.Th.U. the coal contains, a bonus or penalty of 2 per cent. is incurred. For ash contents above the specified limit, a penalty is charged ranging from 2 c. per ton with low ash contents up to 18 c. for all coals rich in ash. A Chicago company who are said to purchase and inspect nearly a million tons of coals for clients, make the number of B.Th.U. the basis of their contract, and adjust the price according to the percentage of moisture and ash. The Interborough Rapid Transit Company, of New York, in purchasing nearly 400,000 tons per annum, base premiums or penalties on the price at a rate of 1 c. per ton for a variation of 50 B.Th.U.

In Germany, consumers have not yet gone as far as our American friends; and though there are occasional contracts effected on the basis of calorific value, this has not become general, but there are a large number of manufacturers, shipowners, public authorities, and dealers who demand a guarantee of a minimum calorific value in their coal contracts. This course seems to be a very reasonable one, and works, as I am informed by one of the largest dealers, to everybody's satisfaction.

I do not think that mineowners or dealers in this country will agree in the near future to have anything like the American system thrust upon them; but I cannot see any reason why they should resist the introduction of more rational methods than those at present in vogue. The consumer who buys coal for its heating value should see that he gets the value for his money that he is expecting. He should insist on having certain properties of his coal supply guaranteed to be up to specification, and should control the uniformity of the deliveries. I have heard it objected against any system of specified coal contracts that the man who is satisfied with a certain coal will continue to use it, and the man who is dependent on a convenient local source has no choice but to continue his supply. The latter is certainly in the minority; and even he is, by proper testing methods, enabled to remonstrate with his contractors should they choose to supply him in irregular fashion. The man who purchases constantly from the same mine must bear in mind that not every part of a certain seam would contain coal of exactly the same value, though the type might be the same throughout.

But how should the buyer who has to choose between a variety select the one best suited his requirements? For him it is most important to know which of a score of different coals would be most advantageous for him to use, and would be cheapest for his given requirements of thermal energy, having due regard to special circumstances, probability of smoke production, ash contents, &c. He would soon find out that a proper control on these lines would amply repay his trouble; and not only would he restrict this control to the supply, but, once he recognized the possibilities at his command, he would extend his attention to the careful supervision of his fuel consumption.

On the other hand, the seller of coal will, if he has a good material to dispose of, not hesitate to guarantee what he is certain of on reasonable terms, and only that class of traders who so far are able to take advantage of the buying public will resist the

introduction of methods which would show their ware in an unfavourable light. Another and most important advantage would result from the general adoption of such a scheme. By the labours of the Royal Commission on Coal Supply, it has been brought to light that the wanton waste which is known to take place with the coal treasure of this country could be considerably decreased, if better and more up-to-date methods of raising and preparing coal were to be adopted. No other means would be more practicable than the universal testing of coal to bring home to the mine-owner the need for improvements in this direction—showing him the advantages to be gained by applying an improvement factor to his coal by the installation of washing, screening, and classifying plant.

In conclusion, I should like to appeal to you to give this matter your serious considerations. Many of your public bodies are themselves manufacturers, and all of them coal consumers on the large scale. It should be the pride of any municipal authority to lead the way in advances of this kind. It should be made impossible for local authorities to be entirely in the hands of their coal contractors; and this will be the case as soon as scientifically drawn up specifications are made the basis of these contracts, and their stipulations are carried out and adhered to in a scientific spirit.

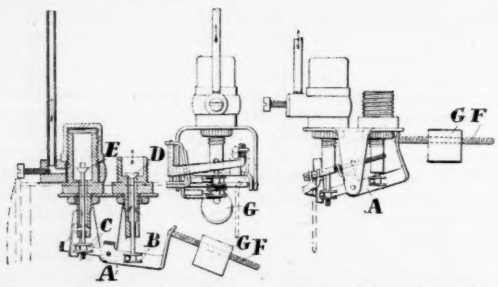
REGISTER OF PATENTS.

Gas Lighting and Extinguishing Apparatus.

ELTON, E. H., and STEPHENS, R., of Clevedon.

No. 2816; Feb. 7, 1908.

This invention relates to gas apparatus operating from a distance, of the type described in patent No. 15,067 of 1906, with the particular object of improving and simplifying the construction and rendering it more effective in operation.



Elton and Stephens's Lighting and Extinguishing Apparatus.

The illustrations represent in sectional elevation the mechanism for operating the valves according to one construction; an end elevation; and a corresponding front view.

The first part of the present invention consists in means for operating the valves of the pilot burner and main burner (as illustrated in the prior specification) directly from a lever by projections or pins provided or mounted upon the lever, which work in grooves in the valve spindles or against the sleeves or flanges provided on it, or by the provision of slots in the lever with which engage the grooved ends of the valve spindles or the like.

As shown, the lever A is provided with pins which engage between flanges B C on collars that are mounted on the respective valve spindles D E; the former being the spindle of the main valve and the latter the spindle of the pilot valve. The collars carrying the flanges are screw-threaded upon the valve spindles to provide for the necessary adjustment.

The second part of the invention—relating to means for regulating the lighting and extinguishing of the burners under varying conditions—provides for the threaded portion of the lever A, or threaded stem F secured to the lever, being of the form shown, and disposed at such an angle as will enable the weight G to be moved from one end to the other of the stem by rotation without altering the difference between the lighting and extinguishing pressures, "due to the increased leverage of the gas pressure upon the diaphragm consequent upon the swinging of the lever."

The required angle of the stem (found by experiment) is such that a vertical line drawn through the weight, at any one of its positions on the stem, will move approximately the same distance along a horizontal line through the lever fulcrum for any given movement of the lever. The angle shown in the first view may be taken as approximately the true angle. Upon increasing the leverage of the diaphragm connection, it is only necessary to bend the stem F downwards to secure the conditions required.

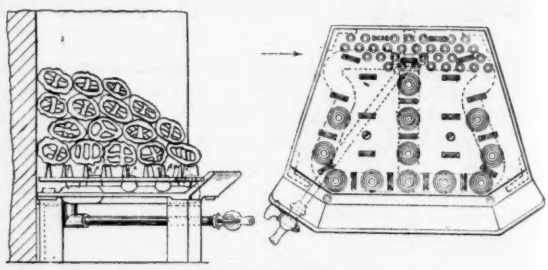
Gas-Fires.

BRATT, L. G. J., of West Norwood, S.E.

No. 5747; March 14, 1908.

This gas-fire is similar to the "barless coal-fires" now much in vogue. It consists of a fire-brick back and sides, with a horizontally extended gas-burner, and a more or less barless means for supporting the asbestos lumps over the nipples of the burner, "so as to obtain a more or less horizontal or heaped mass of incandescent fuel in contradistinction to the usual more or less vertical wall of fuel supported between the fire-brick back and front bars."

In one way of carrying out the invention (as shown), instead of providing the burner heating the fuel with the usual single row of gas-nipples, it is extended both backwards and forwards and arranged to fit between the fire-brick sides and back and extend forward of the sides. The gas-nipples are distributed over this more or less horizontal surface, and suitable projections are arranged between the nipples to support the fuel.



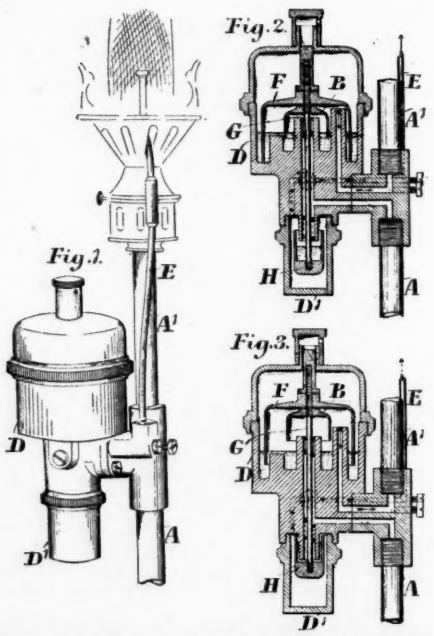
Bratt's Gas-Fire.

Automatically Lighting and Extinguishing Gas-Lights.

ROSIE, J., and M'KELVIE, J., of Edinburgh.

No. 5793; March 16, 1908.

This invention relates to means for automatically lighting and extinguishing public gas-lamps at a distance, by varying the pressure in the mains, and in connection with the supply of gas to churches, halls, &c., by means of a bye-pass on the supply pipe, and the turning on or off of the gas from the area in question—the bye-pass lights alone being left in.



Rosie and M'Kelvie's Automatic Gas-Lighter and Extinguisher.

Fig. 1 is a perspective view of the appliance; fig. 2, a section of the appliance, inoperative as regards the supply of gas to the burner; and fig. 3, a similar view, but operative.

To effect the lighting, the gas enters the stand pipe A, passes to the bell-valve B, lifting it clear of its seal and allowing the gas to flow to the burner-pipe A^1—the gas supply to the pilot light being extinguished during the time the gas is lighted at the burner. The outer casing D has a well for holding mercury or other sealing liquid, and ports communicating with the interior of the bell-valve B and supply pipe A. There are also ports communicating with the burner pipe A^1; the body of the casing having the port I (shown dotted) for supply of gas to the pilot-tube light E.

Depending from the centre of the casing, and slidably fitted to it, is the dome F, closed at the top and open at the bottom. It is provided with a guide-spindle riding up and down into a guide portion closed with a cap; the mouth of the dome dipping into the liquid seal so as to prevent the gas escaping and having access to the inside of the casing between it and the outside of the dome. Depending from within the dome is the bell-valve B, which moves up and down simultaneously with the dome, and controlling the passage of gas from port to port.

Threaded through the bell-valve B and dome F is a depending rod G, which passes down to the chamber D^1 of the casing, and having secured to its end a cup H sealing (or unsealing) with the liquid the opening of the bottom end of the port as the case may require; the cup being moved up and down simultaneously with the bell-valve and dome.

When the dome and bell-valve are down, as shown in fig. 2, the passage of the gas to the burner-pipe is cut off and the light extinguished. The cup H is also down and its port unsealed at its bottom end, so that the gas is free to pass into the chamber D^1; and thence through the port for the pilot light—communicating with the chamber D^1 and pilot-light

tube. The jet of light is kept burning until the cup H assumes the position shown in fig. 3, when it is extinguished; the gas at the burner being "on" and being lighted by the pilot light before the latter is extinguished.

The dome is weighted to suit varying pressures; and the arrangement of the bell-valve B is such that upon the gas emerging from the port the pressure is only distributed over the lesser internal area of the bell-valve, so that, in the meantime, this pressure only becomes the lifting agent for the dome until the bell-valve is clear of the seal, when the gas from it passes simultaneously to the dome and to the port of the burner-pipe.

It will thus be seen that an increased pressure of gas is required to primarily lift the dome, due to the gas only having access to the confined internal area of the bell-valve; but when the gas has access to the interior of the dome as well, a lower pressure (owing to the increased area of the inside of the dome) effects the keeping up of the dome if the gas in the main varies somewhat—this being effected, as stated, by the pressure of the gas on the differential areas.

When the dome is down (in its normal position), it so remains during such time as the gas is at its ordinary pressure; but with increase of pressure, the dome rises and remains up until the pressure is reduced below what the dome is weighted for.

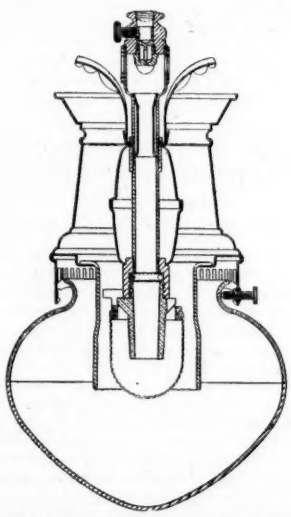
For interior lighting, the appliance may be actuated by varying the pressure by a main stop cock and bye-pass.

Inverted Incandescent Gas-Burners.

SHAW, E. J., of Walsall.

No. 10,284; May 12, 1908.

This invention is particularly applicable to burners of the Graetzin type, designed to afford "greater efficiency in lighting effect" while "remedying defects hitherto existing in inverted incandescent gas-burners."



Shaw's Inverted Gas-Burner Lamp.

The casing is secured to a ring forming a gallery to which the globe is attached. The top (preferably secured by spinning) has a cross-piece attached at its ends to inwardly turned ears on opposite sides of the funnel top. The central gas-tube is protected from the hot products of combustion by an enclosing jacket or sheath held against the cross-piece by the nozzle carrier screwed upon the lower end of the gas-tube. The nozzle screws into a carrier within which is fixed wire gauze immediately above; and, being at the termination of the enclosing jacket, it is found to prevent back-firing with greater certainty than when the jacket does not extend so far downwards. The regulator placed at the top of the bunsen tube consists of a coned pin adapted to enter a hole; its lift being determined by a sliding cylinder to which the pin is attached. The cylinder is perforated; and its movement is obtained by an eccentric pin attached to a revolvable screw passing through the wall of the regulator. A tubular liner is fitted in the position shown, so as to receive the mixture of gas and air and lead it down the gas-tube to a point within the jacketed portion. Direct contact of the gas with parts which might be heated by conduction from the shields and cross-pieces is thus avoided.

Gasholders.

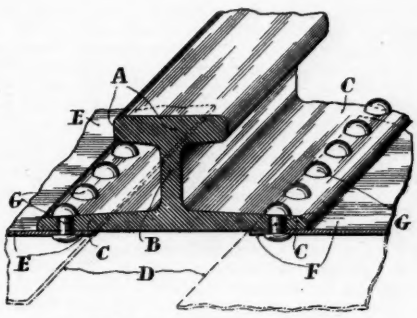
CLAYTON, SON, AND CO., LIMITED, and CLAYTON, J., of Hunslet, Leeds.

No. 12,387; June 9, 1908.

This invention relates to spirally-guided gasholders, in which the spiral-guide rails on the face of the holder are employed in conjunction with runners provided on the holder tank and on the various dips of the holder for supporting and guiding the holder when working.

The spiral guide-rails employed are of |-section, each rail being formed with an extended fixing base made internal therewith and of sufficient width to span the gap left between the ordinary plates of the holder and overlap the adjacent and ordinary plates—the rail being fixed directly to the adjacent and ordinary plates of the holder by closely pitched rivets. By extending the base of the rail outwardly from the web on its opposite sides, so as to span the gap formed in the holder plates, the operation of riveting the rail to the holder plates is facilitated, as the head of the rail does not interfere with the process.

The illustration represents, in insometric perspective, portions of the



Clayton's Spiral Guides for Gasholders.

ordinary plates of a gasholder spaced apart to form the usual diagonal or spiral gap, and being fitted with a guide-rail according to this invention.

The guide-rail of |-section comprises a head A and a web B formed with an extended fixing base C, which latter is made of such a width as to span the gap D left between the ordinary plates E F of the holder and overlap the adjacent and ordinary plates. The guide-rail is fixed directly to the plates by rivets G passed through the plates E F and the base C of the rail.

Metallic Incandescent Mantle.

REESER, H., of Devereux Court, Strand, W.C., and BRAY, H. E., of Woolwich.

No. 13,828; June 30, 1908.

This invention relates to "metallic mantles" "made of materials admitting of them being easily handled without risk of damage."

In one type of such a mantle, threads or filaments are employed which are produced from the oxides of the rare earths, or of the metals of the alkaline earths, or of the elements zirconium, thorium, molybdenum, tungsten, uranium, titanium, vanadium, niobium, and tantalum; while, in another type, threads or filaments are adopted composed of a wire of some precious metal constituting a core which is coated with an oxide of a rare earth. Thus, in the former case, the threads or filaments are of a simple structure and constitute the incandescing member wholly, whereas in the other instance the threads or filaments are of a compound structure with the coating only forming the incandescing member.

Now while such mantles prove an advance over the earlier types, the patentees maintain, yet they possess certain disadvantages in the way of stability, luminosity, and cost of manufacture; and it is with the object of obviating these disadvantages that they have directed their attention to the subject.

In conducting various experiments, they claim to have discovered that an incandescing member composed of an alloy of tungsten and molybdenum overcame the disadvantages before mentioned, and, accordingly, the manufacture of mantles with simple threads or filaments composed of such an alloy, or with compound threads or filaments wherein the coating is formed of such alloy and the core of silver thread, constitutes the principle feature of their invention, though in this connection they point out that they are aware it has been proposed already to make the filaments of incandescent electric lamps of the same alloy, and, in consequence, they wish it understood that their invention is directed to incandescent mantles only.

A subordinate feature of the invention resides in the provision of a ring or bar of some suitable material for not only strengthening the edges of the mantle composed of threads or filaments, but also for supporting the mantle in use with the aid of other adjuncts. The proposed ring or bar is made of U-shape in section, to embrace the edge of the mantle in the resulting cavity, wherein it is secured in suitable fashion.

The alloy is obtained in any of the ways well known to metallurgists; the proportions of the two components being determined by the intended service of the mantle and the shade or intensity of the light desired, though in every case the amount of the tungsten will predominate. It is, however, found that for average purposes the best proportions are 80 per cent. of tungsten and 20 per cent. of molybdenum.

The thread or filament, when composed wholly of this alloy, is produced by any of the ordinary manufacturing processes; and the same remark applies when the thread or filament is composed of a core of silver thread coated with the alloy, though in this instance it is preferable to adopt electrolysis for obtaining the coating.

Safety Gas-Cocks.

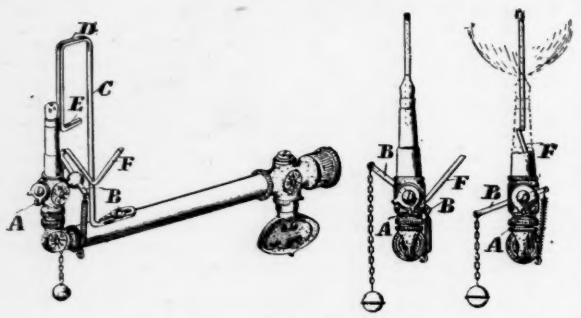
BROCKMAN, H. E., of Sioux City, Iowa, U.S.A.

No. 15,637; July 23, 1908. Date claimed under International Convention, March 13, 1908.

This invention has for its main object a device which will at once automatically shut off the gas as soon as the flame has been extinguished.

A perspective view is given of the burner; also front views of the burner in a position to cut off the gas supply and to permit the gas to flow.

The cut-off cock carries at one end a disc formed with lugs adapted to alternately abut against a lug A projecting out from the casing of the cock so as to limit the movement of the plug. The cock is provided at its opposite end with a head formed with a transverse bore extending through it, in which a rod-like lever B is mounted. One arm of the lever is returned upon itself, and is thence extended upwardly to form a detent so disposed as to oscillate in a vertical plane at right angles to the axis of the cut-off cock when the latter is turned. A compression spring is secured at one end to the opposite arm of the lever B, the



Brockman's Safety Gas-Cock.

other end being secured to the burner at the base. A pull-chain, secured to the first-named arm of the lever, is designed to rock the plug of the cut-off cock against the tension of the spring, so as to turn the cock to the open position.

In order to hold the cock in the open position so long as the gas is not extinguished, the thermostatic rod C, held in a preferably erect position upon the gas-supply pipe, is formed with an off-set looped end secured directly to the supply pipe. The rod projects upwardly parallel to the burner, and is provided at its upper end with a cross bar or arch D, and thence extends downwardly in close proximity to the burner—the free extremity E of the rod projecting in a plane at right angles to the plane of movement of the detent F, and normally just out of the path of movement of its extremity.

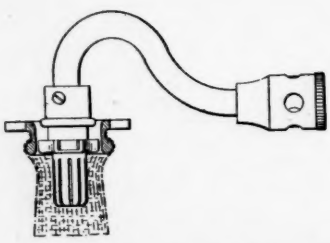
In use, the chain is pulled downwardly by hand and the gas lighted. The cut-off cock is held open for a moment until the heat of the flame expands the thermostatic rod C (or, rather, the depending portion of it) sufficient to cause the laterally disposed extremity E to engage with the extremity of the detent F, and thus maintain the cock open so long as the gas is burning. Should it, however, be extinguished from any cause, it is manifest that the thermostatic rod will at once cool off and contract so as to carry the keeper constituted by the portion E out of engagement with the extremity of the detent, and permit the spring to act and at once automatically move the cock to the closed position and shut off the supply of gas.

Incandescent Burners and Mantles.

MARILLIER, F. W., of Swindon, and STILL, E. H., and ADAMSON, A. G., of Charles Street, Hatton Garden, E.C.

No. 19,731; Sept. 19, 1908.

This invention has for its object "to distribute the flame evenly throughout the length of an annular or open-ended mantle surrounding the burner."



Marillier, Still, and Adamson's Inverted Gas-Burner and Open Mantle.

The burner (as shown) is in the form of a tubular nipple attached to the mixing-tube in any convenient manner. The lower end of the burner is closed, and a number of slits are formed through its wall, extending from its lower end upwards to nearly the top of the mantle, so that the gas-flames issuing from the slits impinge upon the mantle throughout its length. The mantle, rigidly supported at its upper end, is open at the bottom—"thus admitting a full supply of air to the flame, and permitting the mesh of the knitted fabric to be woven much closer than in the ordinary inverted mantle having a closed lower end, and giving increased incandescence over a given area."

The slits in the example illustrated extend radially through the wall of the burner, and are arranged vertically and parallel; but they may, of course, be otherwise arranged, so long as they extend from the bottom upwardly towards the top of the burner.

Coin-Controlled Gas-Meters.

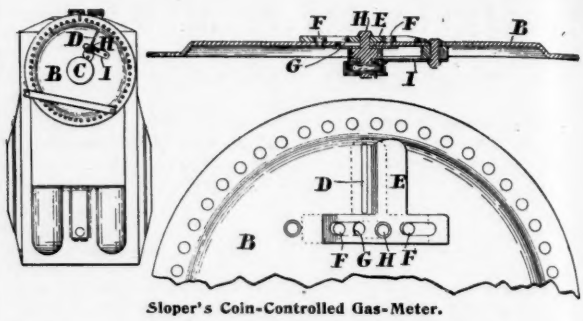
SLOPER, H. T., of New Britain, Connecticut, U.S.A.

No. 20,190; Sept. 25, 1908.

This invention relates to improvements in coin-controlled gas-meters, so as to prevent the introduction of a coin for starting the gas by any unauthorized person.

The illustration shows the side of the meter to which the coin slot-plate and operating knob are applied; also an enlarged section of the coin slot-plate and attached parts, and a rear elevation of same.

The meter has a coin slot-plate B and an operating knob C to be rotated for transferring a coin from the coin-slot to the coin-drawer. The coin-slot D is formed in B, and on the rear or inner side of the plate there is a slide E, for opening and closing the slot. As shown, the plate is T-shaped, and is provided with slots in its horizontal member, and pins F within the slots for guiding the plate thereon. The upright or vertical member of the T-shaped slide leaves the slot



Sloper's Coin-Controlled Gas-Meter.

D open when in the position shown by full lines, while the member comes in the rear of the slot and closes it when the slide is moved into the position shown by broken lines. The coin slot-plate B is provided with a slot G, below the lower end of the coin-slot and extending transversely to the coin-slot. A finger-piece H is placed on the outer side of the coin slot-plate with its shank or inner end extended through the slot G into the slide E, to which slide it is so secured that the slide may be operated to open and close the coin-slot by manipulating the finger-piece.

In order to prevent the introduction of a coin by any unauthorized person, an eye is formed in the finger-piece; and on the outer side of the plate (on the side of the finger-piece towards which it is moved to close the coin-slot) a keeper I is secured, having an outwardly projecting eye adjacent to the finger-piece and in alignment with the eyes or openings therein. When the slide is in position to close the coin-slot, the finger-piece will be near enough to the keeper for the insertion, through the keeper and finger-piece, of the hasp of a padlock, so that when locked the slide cannot be moved to open the coin-slot.

The meter is said to be particularly adapted for use in boarding houses and the like where various persons might put in the proper coin for starting the gas through an ordinary meter without the knowledge of the owner of the house.

Making Coal Gas Economical for Welding Purposes by Increasing its Calorific Value.

KNAPPICH, J., of Augsburg, Germany.

No. 23,992; Nov. 9, 1908. Date claimed under International Convention, Nov. 9, 1907.

The specification of this invention points out that, as is generally known, autogenous welding is at present almost exclusively effected by means of gas of high calorific value—such as acetylene, hydrogen, blue gas, and others in combination with oxygen, or after having passed through a volatile hydrocarbon. It has also been proposed to use air, oxygen, oil gas, acetylene, and poor gas which has been carburetted. According to the present invention, however, coal gas is carburetted (as opposed to the gases enumerated) and used for welding.

The process described (but not illustrated) has for its object to impart a higher percentage of carbon to coal gas, and therefore a higher calorific value to its flame, by carburation with volatile hydrocarbons such as benzine, benzol, gasoline, petroleum ether, and the like. The carburation is effected by a cold method, by interposing a carburettor of suitable construction in the gas-conduit which leads to the welding room. The carburettor is filled with a volatile hydrocarbon as named, and arranged in such a way that the gas flows through it, rises up in bubbles, and is saturated with the vapours of the liquid in the carburettor. The hydrocarbon may, however, be evaporated by dropping into the carburettor, or the carburettor may be filled with a porous mass saturated with the hydrocarbon liquid. The "essential point" is that the passing gas be mixed with the hydrocarbon vapours which are formed in the carburettor.

The patentee concludes: "The coal gas thus carburated gains apparently in heating power, and becomes therefore serviceable—indeed, equal to other gases—in its application to autogenous welding. The latter becomes thereby actually cheaper than by the use of the other gases of high calorific value. It is evident that coal gas thus carburetted in combination with oxygen is quite as suitable for the cutting of metal and the like as for welding."

Consolidated Water-Works Company of Rosario, Limited.—Mr. W. T. Western, presiding on Tuesday last at the fourteenth ordinary general meeting of this Company, said the gross revenue increased from £70,200 to £78,700, while the cost of working and management had gone up from £28,700 to £32,300. The balance was £46,300, being £4800 in excess of the corresponding item in the previous year. After providing for fixed charges and making the usual contribution to the staff provident fund, the Board were able to carry £2500 to the account for depreciation of machinery, to place £7500 to the general reserve, and to declare a dividend of 4 per cent. on the ordinary capital—making, with the interim dividend, 7 per cent. free of income-tax; and the balance to be carried forward was £2800. During the year the Company had laid 38 kilometres (23¾ miles) of pipes, and connected 1368 additional services. On capital account they had expended £36,000 during the past year, of which £9400 was for land, some of which was not immediately required, but would be very useful when the need came to increase the area of their filters. During the current year it was proposed to proceed with the construction of large reservoirs, both for river water and filtered water, and to make preparation for an additional pumping-engine. The Chairman concluded by moving the adoption of the report, and it was carried. A resolution was also passed authorizing the increase of the capital to £440,000 by the creation of 10,000 additional ordinary shares of £10 each.

PARLIAMENTARY INTELLIGENCE.

LLANELLY WATER BILL.

This Bill, which proposes to empower the Llanelly Urban District Council to construct and maintain additional water-works, to define and extend the limits of supply, and for other purposes, came recently before the Select Committee of the House of Commons presided over by Mr. Rose.

In opening the case on behalf of the promoters, Mr. Hutchinson said the first Act obtained was in 1865, under which they expended £40,000; and they borrowed £12,700. There were other Acts. Three reservoirs were constructed, from which the water supply was now obtained. The total amount of money expended was £150,000. At present, the outstanding debts were £94,500. Half the water supply was used for trade purposes at a cheap rate. In 1908, the Llanelly Rural District Council and the Burry Port Urban District Council asked Parliament to pass an extravagant Bill; but it was thrown out. The Urban District Council then promised to come to Parliament this session for a Bill which would remove the objections of the Local Government Board with regard to the necessity of filtration and purification. From one of the reservoirs which was at a higher elevation and capable of affording greater pressure than the others, they would take water which would be passed through newly constructed filter-beds and mains for domestic purposes; while water would be supplied through the existing mains for trade uses. For the purpose of purifying the gathering ground, they were asking for powers to remove a farm which was likely to contaminate the supply. Dealing with the petition of the Llanelly Council, Mr. Hutchinson said they objected to the promoters having any portion of their district of supply handed over to them.

Evidence was given by Mr. Henry W. Spowart, the Clerk to the Council, who said that the total storage capacity was 430 million gallons. Tin-plate manufacture was carried on to a very large extent; and it was essential to the prosperity of the trade that there should be a cheap supply of water. The Council sold a great quantity at 1½d. per 1000 gallons. This was the minimum charge for trade purposes; the maximum being 6d. The works in the town consumed 1½ million gallons per day; the draw from the reservoir being 3 million gallons per diem. For domestic purposes the daily supply was 60 gallons per head. There had been agreements between the Urban Council and the Rural Council in respect to the water supply; but he was not aware of any objection with regard to the quality of the water.

In answer to the Hon. J. D. Fitzgerald, K.C., who appeared for the Rural District Council, witness agreed that the proposal in the Bill with regard to the area of supply was to take the area that was easiest and the most profitable to supply and leave to the Rural Council the area which was not so profitable. They were asking for a right to a portion of the Rural Council's district in perpetuity, and that the Rural Council should have provision that, should the Rural Council want to supply water, they might resume the supply by paying the Urban Council for the mains and pipes they had laid. Part of the lands proposed to be taken included an estate under which were seams of valuable coal—the finest anthracite in the United Kingdom; but it would not be well to sacrifice the wellbeing of the inhabitants or the tin-plate trade for the purpose of extending the working of the coal.

Mr. R. Hawksley, in giving evidence, said the three reservoirs of the Urban Council had a storage capacity of 3½ million gallons, and the consumption would be 2,700,000 gallons a day; leaving a margin of 30 per cent. The water for trade purposes they did not propose to filter, because it was unnecessary and would cost £30,000. Under the present scheme, the expenditure would only amount to £13,000.

Addressing the Committee on behalf of the petition of the Rural District Council, the Hon. J. D. Fitzgerald said the Bill was in contravention of well-settled parliamentary principles. Under the Public Health Act of 1875, the Rural Council were constituted the water authority within their own district; and it was a perfectly well-settled parliamentary principle that these powers should not be taken away by a Private Bill unless some negligence or serious default was proved against them. The promoters were now seeking to annex the low-lying part of the rural area.

The Chairman announced that the Committee were prepared to approve the preamble upon two conditions: (*a*) That the promoters should agree to the insertion of a clause, to be approved by the Speaker's Counsel, similar to the Model Clause 9, with the exception that seven years should be the limit of time for the introduction of a Bill by the Rural District Council of Llanelly, and the purchase of the plant, &c., within the area of the Rural District Council by the Urban District Council should comprise only the distribution plant; (*b*) that the promoters introduce a clause to the satisfaction of the Committee which would give protection to dormant interests of mineral owners.

On the suggestion of Counsel for the promoters, the consideration of these and other clauses was deferred till after the Easter recess.

WEST GLOUCESTERSHIRE WATER BILL.

The Bill promoted by the West Gloucestershire Water Company, for extending the limits of supply and conferring further powers upon them, and for other purposes, was recently considered by a House of Commons Committee presided over by Mr. J. J. Mooney.

Mr. Honoratus Lloyd, K.C., Mr. G. J. Talbot, K.C., and Mr. Algar Howard appeared for the promoters (Messrs. Sherwood and Co., Parliamentary Agents); and Mr. Balfour Browne, K.C., Mr. Lewis Coward, K.C., and Mr. Holman Gregory (Mr. J. Kennedy, W.S., Agent) represented the Bristol Water-Works Company, who petitioned against certain parts of the Bill.

Mr. Talbot, in opening, said the West Gloucestershire Water Company was incorporated in 1884. He believed the Bill, as it came before the Committee, was unopposed except upon the point of the extension of limits. The existing area of supply of the Company was a very extensive one. It was almost entirely a rural district; the population was very scattered over the greater part of it; and, except at the edge of the City of Bristol, it was very sparsely populated. There were a number of places in it which wanted water. On the edge of Bristol, and immediately outside a part of the area of supply of the Bristol Water Company, there was a certain fringe of population, although they had very much the best district from a commercial point of view. The policy of his Company had been to extend as widely as possible, and without relying too strictly upon their rights under the Water-Works Clauses Act to require in every instance a guarantee before providing a supply. It was impossible for a company with an area such as this, if they were to do their duty at all, not to run a certain amount of risk; and the result was to make the commercial return to the Company comparatively small compared with a more thickly populated district. The extent to which the Company had succeeded was shown by the fact that on their 10 per cent. capital they had never divided more than 4 per cent.—and this was what they were paying now; and upon their 7 per cent. capital the limit had been 2¾ per cent. So that they were a long way from their maximum dividends upon all their capital. They supplied some 53,000 people; and the maximum supply was about 1,340,000 gallons. It was impossible to supply the whole district—it was a thing that could never be done, and could not be done approximately for a long time after the Company had commenced operations; but with the exception of the extreme north and south of the area, they did supply most of the principal places. In the north, there was a considerable area which was at present without a supply from them. It was an exceedingly scattered district; and they had felt that as they had not been able to provide for it in all cases, it had been their duty and their policy not to resist applications from others who asked their consent to supply them. Berkeley and Wootton-under-Edge were supplied with their consent—Berkeley by Lord Fitzhardinge (a large landowner in the neighbourhood), and Wootton-under-Edge by the Rural District Council. In the south, where the area unsupplied was much smaller, they were at the present time practically providing for everything that needed provision there. There were works in course of construction from Keynsham to Chew-Magna which would afford all the water that was wanted there. The additions they asked the Committee to include in their area were all small places. Counsel proceeded to mention the particular places which the Company hoped to take in, and which asked for water. They were supplying Northwick and Redwick. The population there was 500; and the Rural District Council of Thornbury, where they were situated, urgently asked for a supply. The need arose mainly in this way. The Severn tunnel of the Great Western Railway Company ran through these parishes and under the river. In the course of constructing the tunnel, a very large body of underground water was tapped; and in order to keep the tunnel clear, pumping had to be kept up there incessantly, especially on the Gloucestershire side of the river. The result had been very much to deplete the water supply of the areas immediately adjoining the Severn. They had taken the risk, at the instance of the District Council, of laying mains there, and were supplying at the present time; and they asked that this should be added to their area. Immediately to the north was the parish of Aust, which they asked to be included. There was also the parish of Sopworth, which they were supplying under an agreement entered into in 1903 with the Duke of Beaufort; and Nettleton, in Wiltshire. From all these places there was no opposition; and the promoters asked the Committee to allow them to take them into their area. Compton Greenfield also, inasmuch as nobody had the right to supply there at the moment and the Company were willing to give any supply that was needed there, they considered ought to be put into their district. Charlton was the only place where there was a controversy between them and their opponents. But the Bristol Water Company had done nothing for the place, although it was in urgent need of water. The real fact, of course, was that the position of the Bristol Company was totally different from the West Gloucestershire Company. There they had a district which, from a water company's point of view, was an exceedingly valuable one. They had the City of Bristol; and the natural tendency of all such companies was to put the town first and to neglect the fringe on the outskirts. It was often, of course, that the town called more for water, but also that it was a far more paying thing. Therefore it was the tendency of all urban water companies to insist somewhat rigidly upon their rights under the Water-Works Clauses Act, to require a guarantee of 10 per cent. for the cost of laying the necessary mains before they would give a supply to any of these places. Early last year events took place which had already formed a matter of contention between them and the Bristol Water Company in regard to a house called Hollywood Tower, owned by Sir George White. Their main was laid; and they believed, and were advised, that if Sir George White laid the pipe from his house and took a supply from them in their own district, they were entitled to supply him. The Bristol Water Company were advised that this was not so; and the question was where were they to supply him. They were entitled under their existing Acts to supply him within their own district; and the question was whether the supply was given at a certain point or at the point where the owner took it. The Bristol Company put the Attorney-General in motion; and they applied to the High Court for an injunction to restrain them, and Mr. Justice Neville decided against the West Gloucestershire Company. He held that the supply was given at the house and the point where the main stopped. The case had got further; but his learned friends were quite entitled to assume that Mr. Justice Neville was right. They had been restrained from supplying the house; and this was one of the matters on which they asked that the Committee, on the question of policy—they having been held to be wrong in law—should be entitled to supply in this and other places in a like situation. The Bristol Company had since developed surprising activity with regard to Charlton, which they had neglected since 1872. The promoters asked the Committee to allow them to supply in the district both the Charlton and the Compton Greenfield areas, which would cover this house; but, of course, they would not come to Parliament or expect the Committee to give them power to supply one house. He believed they would satisfy the Committee that they could and should supply—if they thought fit to throw Charlton

into their district of supply—the inhabitants with water. Counsel next drew attention to the clauses upon which the opponents under the decision of the Court of Referees were entitled to be heard, particularly with reference to clause 40 (power to remove meters and fittings). With one exception, this was a Model Clause form:

> The Company may enter into, and carry into effect, agreements with any local authority, company, or persons, for the supply of water beyond the limits of supply to any such company or persons respectively in bulk for any purpose and for such remuneration and on such terms and conditions and for such period as may be agreed upon. Provided that such supply shall not be given except with the consent of the local authority of the district to be supplied, nor if and so long as such supply would interfere with the supply of water for domestic purposes within the limits of supply.

This clause had been in every Water Bill for a considerable time, with the exception that, in an ordinary Bill, as well as the consent of the local authority the consent of any company or persons supplying water under parliamentary authority within the district to be supplied was required. Counsel then went into the history of the matter, and proceeded to comment upon the petition of the Bristol Company.

Evidence was given in support of the Bill by Mr. *S. F. Andrews*, the Secretary and General Manager to the West Gloucestershire Water Company; Mr. *S. H. C. Coles*, F.S.I., the Chief Agent for the Duke of Beaufort, Lord Glenusk, and others; the Rev. *C. S. Jones*, Rector of Nettleton: Mr. *H. Thurston*, Clerk to the Thornbury Rural District Council; Mr. *F. J. Williams*, Building Surveyor and Sanitary Inspector to the Thornbury Rural Sanitary Authority and Rural District Council; Mr. *J. A. Waller*, of Westbury-on-Trym; Mr. *J. B. Hillier*, of Charlton; Mr. *J. W. Pallan*, of Compton Greenfield; Mr. *T. Spencer*, of Luckington; and Mr. *W. Fox*, civil and mechanical engineer.

Mr. COWARD then addressed the Committee on behalf of the Bristol Water Company against the Bill.

The Committee having consulted in private,

The CHAIRMAN announced that they found the preamble of the Bill proved, with the exception of the portion dealing with Charlton. They would require alterations to be made in clauses 7 (construction of mains, &c., sanctioned) and 40; and they would require a map defining the Charlton area to be drawn up and signed. Unless the necessary alterations were made in clause 40, they expressed the opinion that an undertaking ought to be given that the consent necessary under that clause should not be unreasonably withheld from the Company supplying Sir George White with water in the event of his not being able to get it from any other source.

Mr. TALBOT: Do I understand that you do not give us Charlton, and you do not give us so much of Compton Greenfield as is within Charlton?

The CHAIRMAN: Yes; that is it.

The Local Government Board report having been considered,

Dr. *J. C. Thresh* was examined concerning his visits, to and inspection of, sources and works.

The CHAIRMAN said that clause 40 would have to be remodelled.

Mr. TALBOT said that, in the case of Hollywood Tower, he understood they would be entitled to supply if the consent of the Bristol Water Company was unreasonably withheld.

The CHAIRMAN said the Committee also thought the Bristol Water Company must not unreasonably withhold consent.

Mr. TALBOT: I understand you wish to empower us to supply Sir George White unless they can show cause for withholding their consent—unless they say they are going to give him a supply at once.

The CHAIRMAN: Yes.

At a subsequent stage, the clauses were brought up and considered.

The CHAIRMAN remarked that what he had intended to convey by the decision of the Committee was that they required clause 40 to be framed in accordance with the Model Clause; and if this did not give Sir George White sufficient protection, they, as a Committee, without putting a specific clause in, expressed the opinion that he should get water, and that consent should not be unreasonably withheld.

The clauses were agreed to, with the necessary amendments; the preamble was passed; and it was directed that the Bill, as amended, should be reported to the House.

Mantle Contracts at Nottingham.

The following questions were put by a member at last week's meeting of the Nottingham City Council with regard to the letting of some recent contracts, about which it is said a good deal of comment has been raised. The answers were given by Alderman C. Lovett, the Chairman of the Lighting Committee. In the Committee's application for tenders for incandescent mantles, &c., were full particulars given as to quantities or qualities of the same?—No. Were private trade marks of a particular firm mentioned; and, if so, why?—No. Was only a small quantity of goods ordered for which tenders had been invited?—No. Was the bulk of the mantle contract placed with a member of the Nottingham Ironmongers' Association?—The Committee made no inquiry as to this. Was it known to the Lighting Committee that one of their number is connected with this Association?—No; but if so it is immaterial, as the Association carry on no business. Is it in accordance with the usual practice of the Council to allow interested members to take part in the placing of contracts?—No. Is it a fact that the contract was given to a firm charging 3s. 9d. per gross more than the usual wholesale price of the mantle they were prepared to order, thus adding to the expenditure about £30 on the contract?—Not that the Committee are aware. Have not the Committee had the opportunity of having demonstrated to them that the mantles of lesser price are identical in quality and make, and refused to investigate the matter?—No.

In an attractive little booklet, entitled "Simplicity and Satisfaction in Gas Cooking," Messrs. R. & A. Main, Limited, draw attention to the advantages possessed by the goods which they supply for culinary purposes. Illustrations and prices of various sized cookers are given; and the grillers and boiling stoves are similarly treated. Space is also devoted to the "Main" gas-iron heater, as well as to the firm's hot-water circulator.

LEGAL INTELLIGENCE.

Committal of an Alien for Meter Robbery.

At the County of London Sessions, last Thursday, before Mr. Robert Wallace, K.C., Gregory Koslow, 46, a gas-fitter of Russian nationality, was indicted for stealing 7s. 8d., the property of the Commercial Gas Company. Mr. Huntly Jenkins appeared for the prosecution. The Jury returned a verdict of "Guilty," and the prisoner was sentenced to four months' in the second division, and to be recommended for deportation.

Extraordinary Gas-Meter Robbery with Violence.

At the Thames Police Court last Tuesday, William Musson, 20, a painter, was charged on remand, before Mr. Chester Jones, with stealing 6s. 5d. from two prepayment gas-meters, belonging to the Commercial Gas Company; further, with assaulting Susan Sarah Rogers, a girl of 13, who lived with her parents at 115, Upper North Street, Poplar; and also with the attempted murder of his aunt, Alice Robshaw, at 84, St. Mary Street, Woolwich. Mr. Young prosecuted on behalf of the Company; Detective-Inspector Ball watched the case for the Criminal Investigation Department. The prisoner had lodged at 115, Upper North Street, and on the 15th ult. he, it was alleged, called the girl, seized her, bound a towel round her mouth, tied her hands behind her back, and secured her to the bedstead. He then demanded money, went downstairs, broke open the boxes of the gas-meters, and stole the contents; after which he released the girl, and left the house. Mrs. Robshaw, who had previously been unable to appear in consequence of her injuries, and was still in a very weak condition, deposed that the accused was her nephew. Shortly before ten o'clock on the morning of the 16th ult., he called at her house, and said he intended to join the Army. He then inquired if she was alone, and she replied that she was. She went into the garden, and on her return the prisoner sprang from behind the kitchen door, seized her throat with both hands, threw her on to the floor, and threatened to kill her. Witness described the nature of the violent attacks made upon her; the effect being that she was still under medical treatment. A detective-inspector stated that when he told the prisoner the charge he said he did not intend to hurt his aunt so much, but he wanted the money. He was committed for trial on the three charges.

Compensation Claim at Huddersfield.

At the Huddersfield County Court recently, Alberta Marsden sued the Huddersfield Corporation for compensation for the death of her husband, which, it was alleged, was accelerated by a fall down some cellar steps while engaged in his employment as a gas-meter inspector on May 22 last. In her evidence the applicant said her husband was in the employ of the Corporation for twenty years; and before the accident he had very good health. His wages were 27s. 6d. a week. After the death of Marsden, Mr. E. A. Harman, the Gas Engineer, came to see her, and asked her to sign something, but she refused. She did not receive £5. In cross-examination, she said her husband was "run down" a bit before the accident, and had had some medicine; but she did not know what was the matter with him. The accident happened on a Friday; but he was not seen by a doctor until the following Tuesday. He worked the day after the accident. Then he was in bed for a fortnight; and he afterwards worked from June to October without a break. In November he died. He kept on saying that the accident "finished him off." Dr. Orr, who examined deceased on May 26, found that he had two ribs broken. He had Bright's disease; but witness could not say when this commenced. The accident would, however, certainly aggravate it. Death was in some way accelerated by the accident. For the defence, fellow employees said that deceased had been losing weight for over two years. Mr. Harman stated that the man had previously been in a very delicate state of health; and he had had to reprimand him on more than one occasion when he had shown the effects of drink. Witness was sent by the Corporation to give £5 to the widow as a gratuity. Dr. Collinson gave it as his opinion that an accident of this kind would have extremely little, or no, influence in producing death after the interval stated; and Dr. Irving said the fact that the accident was not mentioned in the death certificate suggested that the bearing of the accident was not in the mind of Dr. Orr when he signed it. His Honour Judge Gent, in giving his decision, said the question was "Would the death have happened as and when it did if there had been no accident?" It seemed to him that this was the true test as established by the cases. There was evidence that Bright's disease might suddenly take a worse turn; but they must take this in connection with the fact that his work did not involve excessive physical exertion. Dr. Collinson's testimony did not materially shake Dr. Orr's evidence; and the latter was the only person who saw and knew the deceased. His Honour found that the accident caused death to take place at the time it did, and that it would not have taken place but for the accident. He made an award in favour of the applicant and the other dependants for £214 10s., representing three years' wages of the deceased.

Alleged Damage to Horticultural Lands by Pumping.

Seven actions brought against the Municipality of New York, in which damages were claimed on the ground that the pumping of water for the Brooklyn supply had injured farm and horticultural lands on Long Island, by drawing off the water or lowering its surface beneath the property, were recently decided in favour of the City. The plaintiffs also asked for an injunction to restrain the City from operating their pumps. According to "Engineering Record," the defendants offered in evidence the results of investigations, extending over a number of years, which showed that the ground-water level was not lowered beyond the property owned by the City, reaching 800 feet north of the wells. The particular cases cited were the driven well

stations at Matowa and Wantagh, which are of about the same capacity. The Wantagh station pumps about 3 million gallons per day from 50 driven wells, varying in diameter from 4½ to 6 inches, and spaced along an east and west line 1500 feet long. Two-inch test wells were driven north of the supply wells on the City's property, and then at intervals extending three or four miles beyond; the maximum well spacing in the farther sections being about 1000 feet. Readings were taken in these wells at regular intervals. During a period of six months, the supply is sufficient to dispense with the driven wells, so that the readings taken in this period are a record of the ground-water level undisturbed by pumping. When the wells have been placed in service, no lowering of the level has been caused by the pumps beyond the 800-feet property limit. The seasonal fluctuations have been carefully determined by normal wells located at such distances from the supply wells and at such points that it is certain that the ground-water level at them is unaffected by the pumping. These readings enable comparison to be made with the other data, so that the seasonal fluctuations will not be interpreted as due to the pumping. Similar investigations have been carried on in connection with the other driven well stations on Long Island.

Claim for Rebate on Water-Rate.

At the Westminster County Court, on Monday last week, his Honour Judge Woodfall gave judgment in a case raising the question of a rebate on water-rate. Mr. Boyce, the defendant, the owner of premises in George Street, Hanover Square, let them to two business tenants. There was one communication-pipe from the water-main, and one person (Mr. Boyce) was assessed by the Metropolitan Water Board, but there were two assessments—£150 and £217. These amounting together to more than £300, Mr. Boyce deducted about £3 as rebate from his payment for water, and the Board sued him for this amount. Mr. Boyce contended that this was one house, with two common staircases giving access to the whole premises, that there was no structural division, and that one person was assessed. The Board submitted that the local authorities assessed each of Mr. Boyce's tenants separately, and that the Board were acting within their powers in making separate assessments. In order to get the rebate, there must be one assessment of upwards of £300. His Honour expressed the opinion that the defendant's contention that the two assessments could be lumped together to claim the rebate was unsound, but he acknowledged that there might be another opinion; and, therefore, in giving judgment for the Board, with costs on the higher scale, he granted leave to appeal. The defendant at first said he would appeal; but later, on a question of costs, he stated that he would not take the matter further. Judgment was then entered for the Board, with ordinary costs.

British Cerofirm Company, Limited, in Liquidation.

A meeting of creditors of the above-named Company was held at the offices of the Official Receiver in Bankruptcy last Tuesday. The receiving order was made on the 23rd of February upon a creditor's petition. The statement of affairs submitted by the Directors showed 47 unsecured creditors for £6487 18s. 9d., and two creditors partly secured for £2922. The assets were estimated to be worth about £1070. The Company was registered on May 24, 1907, to acquire and work a patent for the manufacture of incandescent mantles in Great Britain and the Colonies, with the exception of Canada. The nominal capital was £120,000, in £1 shares; and 100,100 of them were issued and allotted. The vendors of the patent (the Cerofirm Gesellschaft of Berlin) received in respect of the sale £82,500, of which £17,500 was in cash and £65,000 in fully-paid shares. Of these shares, 35,000 were transferred to the promoter, who in addition received £5000 of the cash consideration; and the fully-paid shares were in turn partly transferred by him to the Directors. The Directors stated that they discovered that part of the method of manufacture in question infringed prior patents, and they were consequently unable to do business. One of the Directors went to Berlin, and, after meeting with considerable difficulty owing to the action of a person against whom both he and the vendors made charges, was able ultimately to bring back another process. By this time, however, the season's trade had been lost; and though the Directors themselves had subscribed largely towards the expenses of carrying on the business, they were not successful. After a good deal of discussion, the appointment of a Liquidator was left to the Registrar, and a Committee of Inspection was appointed.

Coal in North Lincolnshire.—After carrying on boring operations for coal in North Lincolnshire for 2½ years, success has, it is stated, at last rewarded the efforts of the Calyx Boring Company, who were the contractors. The seam struck is said to be both extensive and excellent in quality, and is believed to be one of the best in the country.

Fermoy Gas Company's Provisional Order.—The Hon. T. H. W. Pelham, the Chief of the Harbour Department of the Board of Trade, has given his decision on the subject of the Provisional Order applied for by the Fermoy Gas Company, in regard to which he conducted an inquiry on the 5th and 6th ult. (see "JOURNAL" for March 16, p. 800). The Order will be granted conditionally upon the acceptance by the Company of the following alterations: The illuminating power of the gas to be 14 instead of 12 candles, the standard price to be 5s. instead of 5s. 9d., the original shares to carry 8 instead of 10 per cent. dividend, and the additional capital to be reduced from £15,000 to £5000.

Illegal Gas Connections.—At the Bradford City Court, William Nicholls, a metal worker, was fined £2 and costs for making a connection with the Corporation mains without their consent. A gas-bracket had been connected with the inlet-pipe of defendant's meter in such a manner that the gas used was not measured. The explanation offered was that he had "inadvertently" connected the bracket on the wrong side of the meter, and that there was no effort at concealment. The Stipendiary Magistrate remarked that people seemed to think very often that they could play tricks with a public body that they would never think of playing with a private individual. A similar fine was inflicted on Mark Scott, a plumber, for a like offence. His defence was that he was drunk at the time he made the connection.

MISCELLANEOUS NEWS.

GAS-WORKS SIDINGS AND RAILWAY RATES.

In the last two issues of the "JOURNAL," there has appeared a brief report of an interesting case in which the Corporation of Birmingham raised the question of the charges made by certain Railway Companies in connection with the traffic to and from their gas-works; and in view of the importance of the matter, not only to Birmingham, but also to other gas undertakings which possess private sidings, we have thought that it would be of value to readers to be put in possession of a fuller account of the proceedings, which occupied seven days, and at the end of which judgment was reserved. The remainder of the report will be published in the next and subsequent issues.

RAILWAY AND CANAL COMMISSION.

(*Before Mr. Justice* A. T. LAWRENCE, *the Hon.* A. E. GATHORNE-HARDY, *and Sir* JAMES WOODHOUSE.)

Corporation of Birmingham v. Midland Railway Company, London and North-Western Railway Company, and Great Western Railway Company.

Monday, March 22.

This was a case in which the Corporation of Birmingham, who have constructed extensive private sidings at their Saltley, Nechells, Windsor Street, and Swan Village Gas-Works, asked for an order declaring them entitled to an allowance or rebate on charges made by the Midland, London and North-Western, and Great Western Railway Companies on inward and outward traffic to the various works. They also asked for a declaration that the London and North-Western Railway Company had exceeded their maximum charge for the use of trucks. Further, they claimed damages in respect of the past six years' overcharges.

All possible efforts were made by the Corporation to arrive at a settlement; but as these were unavailing, the case had to go into Court. The Corporation first applied to the Court in December, 1906; and the Companies replied the following March. Towards the end of 1908, the North-Western and Great Western Companies amended their replies. They then—two years after the Corporation's first move—gave way on the question of coke rates outwards, and admitted that they were overcharging to the extent of from 1d. to 8d. per ton; and they also made concessions with regard to brick and retort material inwards. These concessions, however, did not meet the views of the Gas Committee; and so the action was proceeded with. After the case went into Court, they also admitted that they had been making improper charges against the Corporation on merchandise delivered to the gas-works in Classes B and C, and Nos. 1, 2, and 3.

The following were the Counsel engaged: For the Corporation: Mr. BALFOUR BROWNE, K.C., Mr. J. A. FOOTE, K.C., Mr. A. H. M'CARDIE, and Mr. J. B. WORTHINGTON (instructed by Messrs. Sharpe, Pritchard, and Co., Agents for Mr. E. V. Hiley, Town Clerk of Birmingham). For the Midland Railway Company: Sir ALFRED CRIPPS, K.C., and Mr. L. MACASSEY (instructed by Messrs. Beale and Co.). For the London and North-Western Railway Company: Sir ALFRED CRIPPS, K.C., Mr. J. A. SIMON, K.C., M.P., and Mr. J. B. ASPINALL (instructed by Mr. C. de J. Andrewes). For the Great Western Railway Company: Sir ALFRED CRIPPS, K.C., Mr. J. A. SIMON, K.C., M.P., and Mr. HAROLD RUSSELL (instructed by Mr. R. R. Nelson).

Mr. Balfour Browne's Opening.

Mr. BALFOUR BROWNE, in opening the case for the Corporation, explained that what they wanted was, first, relief in respect of charges to and from their gas-works in Birmingham. They said that certain rates were in excess of the maximum, and were therefore illegal; that certain rebates should be allowed to them, because they provided accommodation for coal at their works, and also rendered services; and there was, further, a claim against the London and North-Western Railway that they charged for the hire of waggons more than they were entitled to do. The Corporation supplied with gas an area of 114 square miles, with a population of 850,000 people. The capital invested in the undertaking was £3,000,000. There were in all five works; but the application referred to only four of them—Saltley, Nechells, Windsor Street, and Swan Village. The inward traffic was equal to 650,000 tons a year to the gas-works; and of this, 540,000 tons was coal. The outward traffic amounted to 120,000 tons, of which 100,000 tons was represented by coke. Upon this enormous traffic, even 1d. overcharge meant about £3000 a year to the Corporation; so that, though they were dealing with small amounts to begin with, the aggregate value of the concessions they demanded was very great. The correspondence was full of ingenuity on the part of the Railway Companies in withholding information; and the Corporation had had to grope very much in the dark in trying to ascertain what charges were levied, and how they were made up. With regard to the inward traffic, of course, by far the most important were the coal rates; but there were also bricks and retort material from the Corngreave sidings.

THE SALTLEY WORKS.

Dealing first with the Saltley works, these were in the centre of Birmingham, and were served, he thought, by the Midland Railway only—being upon the main line. They were a mile short of Lawley Street Station. The works covered 18 acres of ground, and carbonized 200,000 tons a year. Sidings were laid down by the Corporation to connect the works with the railway system; and an agreement was entered into in 1883 which provided that the Corporation should maintain

sidings on their own land, that all waggons were to be marshalled by them in accordance with the directions of the Midland Railway General Manager, and that the use of the connecting line between the Corporation siding and the Railway Company's siding was to be under the direction of the Company's officials. In most cases the Corporation paid to the colliery proprietors a price which included the sum charged by the railways for carriage; but in others they paid the charge for carriage direct to the Railway Companies. The cost of carriage added on an average about 50 per cent. to the pit-mouth price of the coal. The coal was obtained mainly from collieries in Derbyshire, Nottinghamshire, and Yorkshire; and to a smaller extent from those in the county of Stafford. The delivery of the whole of this coal traffic was regular throughout the year. It was conveyed over practically the same routes, and was dispatched in large quantities by daily consignments, and in trucks containing an average weight of 8 tons. These conditions were unusually favourable to the Railway Companies, and tended to greatly reduce the expense to them of conveying and dealing with the traffic. No allowance was made in the rates charged by reason of the quantity, character, and regularity of the traffic. On the contrary, the rates charged in respect of merchandize delivered to the Corporation sidings were the same as those charged by the Companies to small and casual traders for the conveyance of similar goods under ordinary conditions to Lawley Street Station, notwithstanding that the distance to Lawley Street was a mile greater than to the Corporation sidings at Saltley. With regard to all the traffic, both inward and outward, at the four works, the Corporation did not require the Companies to provide for them—nor, in fact, did they provide—any station accommodation or terminal services at their private sidings. There were no services at all needed at the sidings beyond those incident to the conveyance of the merchandize. The Corporation contended that the Companies (except in so far as the London and North-Western Company had allowed a reduction of 3d. per ton on the coal traffic delivered at the Windsor Street sidings) had included in their rates during the past six years a charge for station accommodation which was not provided, and for terminal or special services which were not rendered at their private sidings; and they claimed that they were entitled to a reasonable rebate in respect of all traffic collected or delivered at each of the sidings. In the year 1896, the Corporation made an application to the Court against the Midland Company, in respect of overcharges, and asking for a rebate; but there was a complete difference in the condition of affairs existing then and now, inasmuch as a large scheme of sidings had since been put down, which were called the Washwood Heath sidings. The Midland Company used these sidings for marshalling their traffic—separating the Birmingham traffic from that of other towns. The Birmingham traffic, of course, included that from the gas-works and the general traffic. From the colliery to Lawley Street, passing through the Washwood Heath sidings, the journey took practically the same time as to the gas-works. These sidings had some thirty sets of rails, and could accommodate about 3000 trucks. They existed for the Company's purposes only. All the traffic at this point was in transit. In fact, it did not finish its journey until it came to the sidings which connected the Corporation siding at the Saltley works with the Midland Company's system. However, it was sought to charge the Corporation with respect to the Washwood Heath sidings, where, for the Railway Company's convenience, two sidings out of the thirty were devoted to the gas-works traffic. The capacity of these two sidings, he believed, was 150 trucks. Of course, the coal came in large quantities, and was dispatched from the collieries in full trainloads. The Corporation had ample room in their own sidings at the works. There were, in fact, some 2 miles of sidings there; and they employed four engines in connection with the in and out traffic. As many as 203 full and empty waggons had been moved to and from the works in a day; while the daily average over a period of seven weeks was 113. The Company did not necessarily deliver the traffic in the order in which it was received from the colliery, because for their own convenience trucks or trains might be left at dead-ends for a considerable time. The Company, however, said that the Corporation, in consequence of the limited accommodation which they possessed, were not prepared to accept delivery of the coal as and when it arrived; and therefore it was hauled into special sidings provided by the Company at Washwood Heath, and reserved for it, and there stored to await marshalling and delivery as and when the Corporation required it. The Company said this was done at the request of the Corporation; but that was a mistake, for no request was made. They also said the Corporation required the waggons in a different order from that in which they were received, and from that in which they had been placed and stored for the Corporation's convenience. This, again, was a mistake. It was no convenience to the Corporation to have the trucks placed in any order at Washwood. They did not want them there, but at Saltley. What they wished was that the coal, as it left the colliery, should come on to them. Then the Company said the traffic for Saltley, after storing and marshalling at Washwood Heath, was worked by the Company from the sidings to a special siding near the Saltley works, which was provided by the Company and reserved for this traffic. Well, so far as he could see, this was the only part of the case where the Company could say anything really was set apart specially for the Corporation traffic. This siding must be some relief to the works, because the traffic was left there, and then taken into the works; but even if the siding were not there, he fancied the Corporation could get their empties out, though it would be somewhat inconvenient. In connection with none of the other works was there any such separate siding accommodation provided by the Railway Company. The Company went on to say that several times during the day and night they worked the traffic with their engines from this siding into the gas-works siding; and the labour and expense were greatly increased by the fact that, owing to the Corporation's limited siding accommodation, the coal could only be delivered to them in far less than full train-loads, and frequently only in a few waggon-loads at a time. The Company added that, after the waggons had been unloaded, they worked them away from time to time, which they had to do in less than full train-loads; and that there was nothing special in the quantity, character, or regularity of the traffic which would justify any such allowance as was being claimed. Dealing with the reduction which the Corporation maintained that they were entitled to, he referred first to what they should have as station terminals. When, he said, they found the charge to a station was the same as the charge to the works that were claiming a rebate, the presumption was that in the latter figure there was included a charge for station terminal. If so, a station terminal was being charged at Lawley Street. The Company said that there was only 1d. in the charge for station terminal at all; but it was a fact that on coke the terminal amounted to 3d. Class A traffic at Lawley Street was liable to a 3d. terminal charge. As he had already stated, the London and North-Western Railway allowed 3d. a ton off the rates to Windsor Street, because the Corporation provided station terminal in the works. If this was the right allowance there, it was (barring the special siding accommodation to which he had referred) a right charge to be taken off the Lawley Street rate. The Great Western Railway allowed 3d. to the Wolverhampton Gas Company off the Wolverhampton Station rate for station terminal; and the Corporation said they ought to have at least as much as that, though, of course, if the station terminal was to be taken on the Pidcock principle there might have to be some reduction in the rebate. The Midland Company said that the terminal charge on coal was only 1d., but this could not be so, when they had a terminal charge of 3d. on coke. He was reminded that 3d. was for the terminal at the station to which the coke was sent. That was so. Coke might be sent from the gas-works to Lawley Street; and then for the station accommodation would be charged 3d. If coal was sent from the colliery to Lawley Street, the charge ought to be the same for coal as for coke, for station accommodation; and therefore if the Corporation saved the Company station accommodation, they ought to have the terminal 3d. The Corporation took delivery and returned trucks far more rapidly than the ordinary trader at Lawley Street; and the Company gained in this way. The waggons conveyed to the Corporation made four journeys a month between the colliery and the gas-works; while those conveying traders' coal only made 2·5 journeys a month, which was to the advantage of the Railway Company. Yet, though they were conveyed a mile less, and though on the previous occasion the Company said "That mile costs us o·6d.," they refused to give the Corporation a rebate as compared with the ordinary trader at Lawley Street Station.

THE REDUCTION MADE IN CHARGES ON COKE.

As to coke despatched from the Windsor Street and Nechells Gas-Works siding, the London and North-Western Railway Company first submitted figures of terminal charges at the forwarding end, varying from 1¾d. up to, in the case of Lichfield, 8¾d. This was their first disintegration of the figures; and apparently they found it would not do, so they had submitted amended figures reducing all these amounts. They now said the charge for terminal services at sending end was 1d. in each case; and the charge for terminal services at receiving end was 3d. in each instance. They added that the balance of the rates in every case was attributed to conveyance. But if they attributed it to conveyance, it brought the conveyance rate over the maximum they were entitled to charge in a large number of instances; and they had reduced the coke rates in consequence. Take Lichfield as an example, the rate was 2s. 2d.; and it had now been reduced to 1s. 6d. This was not on the question of rebate. The Corporation said that if the 1d. with regard to Lichfield was right, and 1s. 6d. was all the Company could charge for conveyance, the Corporation, having been charged 2s. 2d., claimed to have the difference refunded to them.

Sir JAMES WOODHOUSE: It was 2s. 2d.; but it is now 1s. 6d. Do you say that this is the maximum of their charging power?

Mr. BALFOUR BROWNE: That is what I understand; but they could justify it if they had been entitled to charge 8¾d. for a terminal, and that is the way they did justify it in their first disintegration. Now that they cannot justify it, of course, they have to reduce the rates. Therefore we say it is juggling, because that is not the terminal they were charging. It is now, because I want a rebate, that they put down 1d.

Sir JAMES WOODHOUSE: What you say is that the distribution they made first was a purely artificial disintegration?

Mr. BALFOUR BROWNE: Absolutely artificial, as you can see, because in every case it varied; and it was only made in order to justify the total they were charging.

Sir JAMES WOODHOUSE: We have heard of that in other cases.

Mr. BALFOUR BROWNE: We have. It is not the first time that a railway company have been driven to that ingenuity.

Justice LAWRENCE: Am I right in supposing you say you have got a reduction out of them by reason of your stirring the matter up?

Mr. BALFOUR BROWNE: Yes, a great reduction on the coke rates; but even now, when they say "We are charging this 1d.," we say that it is too much. They have no right to charge 1d. at all.

THE NECHELLS WORKS.

As to the Nechells works, these were served by two Companies—the London and North-Western and the Midland. They were completed in the year 1900, and were capable of carbonizing 100,000 tons of coal a year. They had sidings on both lines. The traffic for Nechells was treated in exactly the same way as that for Saltley, so far as the Washwood Heath sidings were concerned. It was then separated, and hauled to Duddeston Mill sidings, and afterwards put into a connecting line between the works and the Railway Companies' sidings. This line held from twelve to fifteen trucks. A Corporation locomotive went and picked the trucks up and hauled them into the works; and the Corporation said the traffic was still in transit until it was deposited there for them to take away. That was to say, it was delivered to them there; and they took it away by their locomotive, and carried it into the works. They maintained that there was no accommodation provided or service rendered by the Midland Railway Company at this place. In the report of the case of the *Chatterley Iron Company v. The North Staffordshire Railway Company*, before this Court, the following appeared: "The fifth question distinguishes between the main lines of a railway and the subsidiary lines used as sidings for shunting, handling of goods, and other like services; and it is proposed that it should be asked whether in using or giving the use of sidings for such purposes the North Staffordshire Company do not perform a terminal service within the meaning of the 86th section of the Company's Act of 1847, or of the 19th section of

their Act of 1864, and may not make an extra charge in consequence." In his judgment, Sir Frederick Peel said: "A railway company could not carry on the business of a carrier if they had no place to shunt, or to stand or deposit their trucks in; and they cannot therefore be said to perform a special service, which are the words of the 86th section, by having and using or granting the use of such places." As to the Washwood Heath siding, he (the learned Counsel) said the Railway Company could not carry on their business without it; and according to the case he had quoted, they were not entitled to charge for it.

Justice LAWRENCE asked whether this was quite consistent with what happened in regard to the application in 1896, which was apparently defeated by reason of services rendered at certain sidings.

Mr. BALFOUR BROWNE replied that they were sidings in exactly the same position, he took it, as the special one he had referred to at Saltley. They were sidings dedicated to the use of the Corporation's particular traffic, which could not be worked without them. The Washwood Heath sidings, however, were away from the gas-works, and not connected with the delivery to these works. They were used for the purpose of separating Birmingham traffic from that of other towns, and also for sorting out the station traffic from the siding traffic. What he thought was the decision in the Chatterley case was that anything which was essential to the railway company's own duty, which was the conveyance of goods, could not be charged for except as part of the conveyance rate; but if a company provided a special siding for a particular works, they were entitled to charge for it. As to the North-Western Railway, they refused until last February at Nechells the rebate of 3d. on coal which they allowed at Windsor Street. They were now giving it; but the Corporation asked for an order.

THE WINDSOR STREET WORKS.

At Windsor Street there was a siding made under an agreement. The coal traffic to the works was 170,000 tons a year; and it came from Yorkshire and Derbyshire. It was brought to the works by the London and North-Western Railway, who, as he had stated, allowed the 3d. terminal rebate on coal. There was therefore nothing more to say about this. The sidings at Windsor Street were very extensive.

THE SWAN VILLAGE WORKS.

The siding accommodation at the Swan Village works was amply sufficient. The Great Western Railway charged the same rate to the gas-works as to the Swan Village goods station, which was close to the gas-works siding. They did precisely the same with the Corporation traffic as with their own traffic to the station; and yet they denied that the Corporation were entitled to a rebate. The Company said that, in consequence of the position of the siding at Swan Village, and owing to the fact that the siding junction was only with the up-line, all outward traffic had to be worked in the first place into West Bromwich Station, after which it had to be worked back, if it was destined for places north of the Corporation's siding. For the same reasons, all inward traffic coming from the south had to be worked past the siding in the first place into Swan Village Basin Station, and subsequently taken back to the siding. That they so hauled the Corporation goods was quite true; but they did the same for their other traffic, and so it was not for the convenience of the Corporation, who did not want it done.

THE QUESTION OF WAGGON-HIRE.

Another claim the Corporation made was with regard to waggon-hire. Section 9 of the London and North-Western Railway Company's Act of 1891 entitled the Company to charge for the use of trucks provided by them for the conveyance of merchandize, when the provision of trucks was not provided in the maximum rates for conveyance, any sum not exceeding 4½d. per ton for distances of not over 20 miles. As a matter of fact, the Company had charged 6d.; their argument being that they were entitled, when the journey was partly over their system and partly over that of other companies, to charge 4½d. per ton for the distance between the Corporation sidings and the point of junction, together with such additional sum as the other companies were empowered to charge. The 6d. was a commutation of these two sums.

MISCELLANEOUS TRAFFIC—WHAT THE CORPORATION CLAIM.

The Corporation also made claims with regard to miscellaneous traffic, which the learned Counsel set forth at some length. Various reductions, he said, had been made by the Companies while the application to the Court was pending; but these were not such as the Corporation contended ought to be granted. He asked the Court to fix what was a fair rebate to be allowed to them off the station rates in the cases complained of—leaving out the North-Western so far as they had already granted a rebate at Windsor Street and Nechells. He suggested that the rebate on coal should be 3d. per ton. They also asked for a similar rebate on coke outwards, because they provided in that case, too, the station, which was not furnished by the Railway Company. As to the general traffic, a like argument applied. Then the Corporation claimed damages in connection with the reduced coke rates. The Companies had been charging them, under their own showing, as a pretended terminal (to take one case), 8¾d. per ton, when they now said they were only entitled to charge 1d., and the Corporation said they were entitled to charge nothing. The Great Western Company admitted that since the application was filed they had revised certain of the rates for coke from the Swan Village siding; and they had stated their willingness that the accounts should be adjusted as from the date of the application. He also wanted damages in connection with other reductions that had been made, where the Company had admitted they were wrong.

Mr. SIMON said the North-Western Company were prepared to do the same as the Great Western in this respect—that was, to make the reduction retrospective.

Mr. BALFOUR BROWNE remarked that he must be fortified by the order of the Court. Of course, he further claimed damages in respect to the overcharges for waggon-hire. It was a very complicated and a very difficult case.

The Court then adjourned.

For the past year, the Directors of the Colonial Gas Association have declared an interim dividend of 2s. per share on the ordinary shares, and of 4s. per share on the founders' shares.

THE RETIREMENT OF MR. LAYCOCK.

As was stated in last week's "JOURNAL" would be the case, the Keighley Town Council, at their meeting last Tuesday, were asked by the Gas Committee to accept the resignation of Mr. John Laycock of his position of Gas Engineer and Manager, and to appoint him Consulting Engineer for five years.

In submitting these recommendations, Mr. John Harrison, the Chairman of the Gas Committee, paid a high tribute to the energy and capability of Mr. Laycock, and expressed the opinion that the retention of his services as Consulting Engineer would be highly advantageous to the town. Mr. B. S. Brigg, as one of the old members of the Council, and one who had been in touch with Mr. Laycock and his work for nearly forty years, also spoke very highly of the services of that gentleman, and referred to the development of the works under Mr. Laycock's direction. Few corporations, he said, had had the services of so able, successful, and conscientious an official. The history of the gas-works under the management of Mr. Laycock was a record of continuous progress. If evidence were needed of his successful management, it would be found in the fact that the total amount of profit paid by the undertaking, after allowing for interest on capital, under his management, was no less than £326,000. If these figures could be given to some of the people who objected to municipal trading, they would not, he thought, be quite so certain that municipal trading was always a mistake. In Keighley, so far from being a mistake, it had been a great success. The Mayor (Mr. James Wharton) said he was glad the Committee had agreed to retain Mr. Laycock's services in a consulting capacity; but he did not like a five years' agreement. The proposals were adopted without a dissentient.

On the recommendation of the Gas Committee, Mr. William Baillie, the present Assistant at the gas-works, was appointed Engineer and Manager on probation.

SATISFACTORY WORKING AT LANCASTER.

Reviewing the position of the gas undertaking at the quarterly meeting of the Lancaster Town Council, Alderman Helme, M.P., said they had every reason to be satisfied with the balance-sheet. On the income side they had estimated that from the sale of gas they would derive £18,930; and by the end of the month the receipts would be within 11s. 5d. of this sum. The price of coke and residuals was always a matter of uncertainty, being regulated by the state of the markets; and from this source, against an estimate of £6290, they had received £5818. But in regard to coke they had suffered a money loss of £200 in the effort to share the policy of the Corporation in providing for the distress in the town. For products from tar and liquor they had received £3279, against an estimate of £3500. The total estimated income was £29,432, and they had actually received £28,771—a shortage of £662, including the £200 spent on coke. In regard to the expenditure, the policy of the Committee respecting the purchase of coal had been eminently successful. They refused to contract at the prices put before them a year ago; and the result had been that they had saved some £700 in the price paid. Allusion had been made to the salaries paid in some departments; but in the Gas Department they had worked very carefully, and under the head of salaries and wages for carbonizing the expenditure was below the estimate—£1282, as against £1300. The total expenditure was estimated at £26,580; and it actually worked out at £25,986. They had been able to spend £233 in maintenance of works, £63 in maintenance of mains, and £466 in extension of mains; the latter being really a development on capital account charged to revenue. They came out at the end of the year, therefore, with a profit in round figures of £5000. This was made up of £2000 contributed to the relief of the rates, £784 put to the reserve fund, £1700 the value of gas supplied for the lighting of the town, £200 earned but spent in coke for the relief of distress, and £466 spent on new mains—a total of £5150 as the result of the year's working. The £784 carried to the reserve fund would make the total of the fund £11,797; but against this the Council had sanctioned the expenditure of £250 for new testing plant, and £500 for a scrubber-washer. In considering the question of the distribution of gas to the town, especially with regard to unemployment, he had conferred with the Manager (Mr. Charles Armitage); and in view of the generous support of the Finance Committee in the building-up policy which had made the department so strong, it was possible that, after providing for the contribution to the rates, they might spend £700 in laying a 12-inch main in certain streets. This would provide a considerable amount of employment, especially if, as they hoped, they were able to procure the pipes locally. In the estimate for next year they anticipated a fall of £329 in income from gas, owing to power being supplied to users of gas-engines at a lower price; the total being £18,600. From coke they estimated to receive £5637, and from other products £3300; the total estimated income being £28,234, as against £28,771 last year. They put down the cost of coal at £12,000, and the total expenditure at £25,846, against £25,986 last year. This they hoped would provide not only £1700 for the supply of public lighting but the £2000 for the rates, which might be regarded as a regular contribution, and £386 for the reserve fund. In conclusion, he paid a tribute to the care and ability with which Mr. Armitage conducted the work of the department.

Several members congratulated both the Gas Committee and Mr. Armitage on the excellent results attained.

Idle Gas-Works at Bradford.—When the minutes of the Gas Committee were submitted to the last meeting of the Bradford City Council, Mr. Hustler suggested that the gas-works at Idle and Eccleshill, which were standing useless, should be sold. Mr. Geldard, who moved the adoption of the minutes, observed that the Council, when they bought the out-district gas-works, ought to have been more careful as to what they were doing. The only use which was made of the Eccleshill works was that in winter the holder was brought into requisition. He had no objection to selling the rest of the works.

THE PROPOSED LIGHTING EXPERIMENT AT PLYMOUTH.

The refusal of the Electricity and Street Lighting Committee to permit the Plymouth Gas Company to demonstrate the advantages of gas for street lighting, was the subject of some discussion at the meeting of the Plymouth Town Council yesterday week.

Mr. Munday asked why the Committee shirked the proposed test, and said he found it difficult to understand why they should refuse the offer of the Gas Company. Mr. Jacobs thought the refusal to allow the Gas Company to show what they could do was a plea of "Guilty" on the part of the Electricity Committee. Mr. Anthony, the Chairman of the Committee, replied that he thought the use of the word "shirk" hardly fair. The proposal was made that experiments should be carried out at the expense of the ratepayers to show which was the more effective system of street lighting; and the Committee felt that the present was not the right time to adopt the suggestion. As experiments of a similar character were being conducted in other parts of the country, the Committee were of opinion that the chestnuts might just as well be pulled out of the fire by other people as by themselves. Another difficulty was as to who should be the judge. If it rested with him, he should declare in favour of electricity, and say it was the best. The "JOURNAL OF GAS LIGHTING" had commented on this matter: and it had also said that the Committee "shirked" this trial. The Committee had not shirked their responsibilities in the least. Mr. Munday remarked that he had not seen the "JOURNAL OF GAS LIGHTING," and had no interest in the Gas Company. Mr. Anthony said he did not mean that his remark should be taken in any personal sense. The Committee considered that it would be useless expense to contemplate the possibility of having to "scrap" all their electric lighting standards. At the same time, if the Gas Company had any suggestions to make for the improvement of the gas lighting where it was used, they would be glad to consider them.

At the same meeting, Mr. Pengelly called attention to a minute instructing the Electrical Engineer to submit an estimate for installing the electric light at North Road School, which is to undergo extensive alteration, and asked whether the Education Committee had considered the cost of improved gas lighting. Alderman Woollcombe, Chairman of the Committee, thought there would be no objection to considering the cost of gas as compared with electricity; and an amendment directing that an estimate should also be obtained for improved gas lighting was carried.

THE ELECTRIC LIGHTING DEFICIENCY AT HASTINGS.

Gas Company Successfully Object to the District Rate.

At the Meeting of the Hastings Town Council on the 2nd inst., the Finance Committee reported that on the 18th ult. the Town Clerk received from the Hastings and St. Leonards Gas Company a notice of appeal to Quarter Sessions against the general district rate made on the 5th of March on the following grounds:

(1) That the rate is bad in law, inasmuch as it includes retrospective charges. (2) That it includes charges and expenses which had been incurred and became due more than six months before it was made, contrary to the provisions of section 210 of the Public Health Act, 1875. (3) That included in the estimate of the rate, and levied by it is the sum of £1615 19s. 4d., or thereabouts, being a deficit on the electric light undertaking and works for the year ending March 31, 1908. (4) That included in the estimate of the rate, and levied by it, are sums, being deficits on the electric light undertaking and works for a period prior to Sept. 30, 1908. (5) That the Mayor, Aldermen, and Burgesses so acting through the Council did not, before proceeding to make the rate, cause an estimate to be prepared of the money required for the purposes in respect of which it was to be made, showing the several sums required for each of such purposes, and in particular did not cause an estimate to be prepared of the money required for the electric light undertaking and works for the year in respect of which the rate was made, contrary to the provisions of section 218 of the Public Health Act, 1875. (6) That by reason of the inclusion of such sums, or some one or more of them, and of the omission, the rate is rendered invalid and should be quashed.

The Committee were advised by Counsel that the inclusion of the amount of the deficit in respect of the electricity undertaking at March 31, 1908, in the expenses to be defrayed out of the rate was a good ground of appeal, it being a debt incurred more than six months before the making of the rate. The same objection would apply to the items in respect of part cost of altering the Front Line lamps and installing electric arc lamps in Queen's Road and Cambridge Road. The Committee were further advised, however, that it was open to the Council to amend the estimate already approved, by eliminating therefrom items that were improperly included, and by inserting other items that might have been included. They therefore recommended that the estimate for a general district rate for the year ending March 31, 1910, which was approved on Feb. 19 last, be amended by excluding the sum of £1625 2s in respect of the electric light undertaking deficiency at March 31, 1908, and by substituting for the sum of £5723 2s., inserted in the summary opposite the item "electric lighting," the sum of £4098, representing the anticipated deficiency for the year ending March 31, 1909, and by inserting the estimate showing how the deficiency is arrived at, by striking out the following items: One-third estimated cost of altering Front Line lamps, £711; one-third cost of installing electric arc lamps in Queen's Road and Cambridge Road, £72, and inserting the following items in the summary: Amount expended during the half year ending March 31, 1909, on special work for unemployed at Buckshole reservoir clarification works, Bopeep Sanatorium, &c., £1127; amount overspent during half year ending March 31, 1909, in clearing snow, £500—total, £1627.

The Committee also reported that a communication had been received from the Local Government Board stating that they had had under consideration the report made by their Inspector, Mr. Fawcett, after the inquiry held by him with reference to the application of the Council for sanction to borrow £1683 for the purpose of fitting certain public gas-lamps in the borough for electric lighting; and that, on the information at present before them, the Board were not satisfied that the proposal was one for which a loan should be sanctioned, and were, therefore, not prepared to comply with the application. Under the circumstances, the Committee recommended that the following item should be inserted in the estimate, with a view to the carrying out of a portion of the work during the year ending March 31, 1910: Fitting certain existing gas-lamps for electric lighting, £500; and that the estimate should be further amended by making all necessary consequential alterations, including the substitution in the summary for £62,987 2s., estimated amount required to be raised by rate, the sum of £62,7c6. The amount of the rate (3s. 2d. in the pound) estimated to realize £62,456 16s. would not, therefore, be affected.

The Committee further recommended that no part of the general district rate made on the 5th of March for the year ending March 31, 1910, be applied towards defraying any of the items to be now excluded from the estimate; that this and the amendment of the estimate be forthwith notified to the Gas Company; and that in the event of the Company proceeding, the Town Clerk be authorized to take all necessary steps to oppose the appeal.

Mr. A. W. Chesterfield, in moving the adoption of the report, said the Committee greatly regretted the necessity for it; but they felt they had no other alternative. There was no item in the estimates for which they need be sorry to be responsible. Alderman Parker seconded the motion; and it was carried.

ANTWERP WATER-WORKS COMPANY, LIMITED.

At the Annual Meeting of the Company on March 29—Mr. EASTON DEVONSHIRE presiding—the Directors reported that the income, from all sources, amounted to £78,712, as compared with £73,908 in 1907; and after deducting working expenses, the cost of laying on services, and London expenses, there was a balance left of £53,258. To this was added the undivided profit of £7877 brought forward from the last account, and interest on investments £214—making a total credit of £61,350. Against this there had been charged debenture interest and income-tax for 1908, the contribution to the reserve account of 5 per cent. on net profits, the interim dividend of £13,500 (at the rate of 9 per cent. per annum), the transfer to the sinking fund for redemption of debentures of £1900, and for that of the share capital £6250, and the Directors' extra remuneration (as provided for by the Articles) of £2243. The sum of £29,781 was left, out of which the Directors recommended that a balance dividend for the six months to Dec. 31 be paid at the rate of 12 per cent. per annum, free of income-tax, absorbing £18,000, and making a total dividend of 10½ per cent. for the year—the balance to be carried forward being £11,781.

The CHAIRMAN, in moving the adoption of the report and accounts, congratulated the shareholders on the exceedingly satisfactory results of the year. The income received from the water-rentals, he said, created a record. It was £6868 higher than in 1907, or about 10½ per cent. on the rental for that year. It would be wise, however, to consider part of this increase as somewhat exceptional. The State Railways used rather over £4000 worth of water during the year; but the Railway Department was now preparing a scheme on a somewhat gigantic scale, including a reservoir of 5 million cubic metres capacity, for the supply of filtered river water for railway purposes. When the scheme was completed, the railway would no longer have need of the Company's supply. It would take about three years to carry out the scheme; but the Directors had every reason to expect that, during this period, a very large supplementary supply of water would be required from their mains at Antwerp. At the same time, it would have been noticed from Mr. Kemna's report that there had been a falling off, owing to bad trade, in the general meter supply for private trade consumers, and also in the shipping supply. He (the Chairman) thought, however, they might anticipate that, in the course of a few years, the return to normal conditions would compensate any loss there might be through the cessation of the railway supply. Taking this into consideration, and also the fact that they were able to carry forward a large balance of undivided profit (over £11,000), the Directors were, in his opinion, quite justified in giving full dividends this year in accordance with the Articles of Association. One of the items showing serious falling off was shipping supplies; and this indicated the state of trade. The diminution was no less than £500. One of the most satisfactory items was that of the increase of domestic supplies. It was no less than £3200 for the year. The Manager's report showed that the increases had been in geometrical progression since 1900. Whereas in 1900 the increase over the previous year was 20,278 frs., in 1908 it was 78,411 frs., or nearly four times as large. During the past year they had completed a series of what were known as Puech filters, or gravel strainers. The plant had not been constructed solely for the chemical improvement of the water, but because, by its use, they were able to avoid an increase in the storage reservoirs. The Directors only adopted the strainers after long experiments, and finally with certain modifications and improvements (as he thought) on the original system. The expenditure on them seemed to be fully justified. The improvement in the quality of the water was remarkable, both in its appearance and in its chemical quality. They had also made a large expenditure during the past year, £4163 (which had been charged to the reserve account), in improving and altering the machinery. This expenditure was sure to pay for itself in a few years time by economy of fuel and by efficiency in pumping. A triple-expansion engine had also been moved from the Waelhem works to the Luithagen station. It had been supplied with larger pumps; so that practically they would be able to pump, with the same quantity of fuel, 50 per cent. more water with one engine. As to the general expenditure, the increase in pumping and engine charges and in maintenance and repairs, was, generally speaking, completely justified by the increase in the quantity of water pumped and

sold—the addition being 618,577 cubic metres or tons, and equal to about 15 per cent. increase over 1907. A very interesting fact was brought to light by a diagram sent over by Mr. Kemna. It was that the death-rate of Antwerp had fallen since 1898 from 17·7 to 12·7. He (the Chairman) thought the Company could claim some little credit for this, because during the same period they had added 10,000 to the number of houses supplied with water. At the present moment, they supplied 20,000 houses out of 39,000. When the demolition of the fortifications occurred (this would commence in the year 1910) he had great hope that the Company would have a further increase of customers in a very short time, by building proceeding within the at present prohibited area of 1000 metres from the fortifications. In regard to what would occur to the Company in 1911, they were much in the same position as when the shareholders last met. The matter was being carefully studied and considered by the authorities, and in a reasonable way. The Directors thought the management of the water supply of Antwerp could not be in better hands than now. However, there was no need for anxiety one way or the other.

Mr. GEORGE EVANS seconded the motion; and it was carried.

Other resolutions were passed, declaring the dividend, re-electing Directors and Auditors, and thanking the Chairman and Directors for their services.

SALE OF THE PONTYPRIDD WATER-WORKS.

Provisional Agreement Signed.

It was mentioned in the "JOURNAL" last week (p. 51), that terms had been practically arranged by which the Glamorgan Water Board, for the constitution of which a Bill is now before Parliament, will acquire the undertaking of the Pontypridd Water Company. We now learn that an agreement has been signed for carrying out the transfer, subject to the formation of the Board being sanctioned by Parliament—the purchase price being £333,000 in the gross. The actual price for the existing concerns, which include the two reservoirs at Mardy, having a storage capacity of 220 million gallons and 20 million gallons respectively, together with the whole of the mains, &c., is £310,000. The remaining sum (or £23,000) is mainly made up of the proportionate cost of £15,000 incurred by the Water Company in promoting their Bill last session, which conferred powers for carrying out the Llia scheme, and the expense which will be entailed in connection with the Bill now before Parliament for extension of works, together with £8000 compensation to officials, &c., and contingent payments. Though a "sterilization" clause was inserted in the Act obtained by the Company last year, the Board agreed to a payment of a fair proportion of the cost commensurate with the benefits they will obtain under the powers conferred by the measure. The capital outlay on the existing undertakings of the Company is practically a quarter-of-a-million, and the dividends paid last February were 7½ per cent. on the 10 per cent. maximum shares, and 5¼ per cent. on the 7½ per cent. maximum shares.

PROTECTION OF MUNICIPAL RESERVOIRS.

The Corporations of Lancashire and Yorkshire, who have reservoirs in their keeping, are protesting against an attempt to interfere, needlessly as they think, with their control. At present these reservoirs are treated as private property; but an endeavour is being made to bring some, if not all, of them under the jurisdiction of the Lune Fisheries Board. In many of the reservoirs it has been the practice to allow fishing, subject only to the authority owning the water; but Manchester occupies an exceptional position. The Water Committee regard the presence of the angler as tending to jeopardize the purity of the water. Where the water is filtered before passing into the mains, which it is not in Manchester, this objection does not apply; but as regards the importance of maintaining unrestricted control over the reservoirs, the Corporation are understood to be in full accord with the other water authorities of the two counties.

With the object of organizing opposition to the proposals above referred to, an influential meeting, convened by the Town Clerks of Bradford and Lancaster (Mr. F. Stevens and Mr. T. Cann Hughes), was recently held in the Victoria Hotel, Manchester. The gathering was a representative one, and was presided over by Alderman Land, of Bradford. The proceedings were conducted in private; but at the close the result was communicated to the Press. It was to the effect that, on the motion of Mr. Bennett, a member of the Sheffield Corporation, seconded by the Town Clerk of Rotherham (Mr. W. J. Board), the following resolution was carried unanimously: "That this meeting urges and recommends all the water authorities in the districts affected by the proposed Provisional Orders for the constitution of Fishery Boards in certain districts of Lancashire and Yorkshire at once independently to lodge objection to the proposed Orders, so as to secure a definite exemption of all reservoirs belonging to water authorities from the operation of the Orders; and that a Committee, consisting of representatives of Leeds, Bradford, Rotherham, Sheffield, Huddersfield, Bolton, Halifax, Harrogate, Doncaster, Burnley, Manchester, Liverpool, Barrow-in-Furness, Rochdale, and Lancaster, be appointed to consider the action to be taken to give effect to the above resolution, and to protect other authorities from similar Orders, and as to a division of the expenses of such opposition between the authorities affected." The Town Clerks of Bradford and Lancaster were appointed the Hon. Secretaries of the Committee.

Notice of objection to the increased assessment of the Leeds Corporation Gas-Works in the township of Armley and Bramley has been served upon the Assessment Committee of the Bramley Union; and the Town Clerk is to be authorized to take such steps as he may deem necessary in the matter.

LAND FOR BIRKENHEAD WATER-WORKS.

Arbitration Proceedings.

At the Surveyors' Institution, on Monday, March 29, an arbitration was opened to determine the price to be paid by the Birkenhead Corporation for the compulsory acquisition of land on the Hafod Elwy and Taincha Estates, Denbighshire, owned by Mr. A. O. Evans, required for carrying out the extensive scheme of additional water supply sanctioned by the Corporation's Act of 1907. The price asked by the claimant for 2039 acres was about £100,000.

Mr. TOBIN, K.C., was Arbitrator for Mr. Evans; Mr. MONTAGUE SHEARMAN, K.C., acted in a similar capacity for the Corporation; and Sir EDWARD CLARKE, K.C., was the Umpire. Mr. T. G. HORRIDGE, K.C., Mr. F. E. SMITH, K.C., and Mr. C. C. HUTCHINSON appeared for the claimant; Mr. BALFOUR BROWNE, K.C., Mr. ELLIS J. GRIFFITHS, and Mr. LESLIE SCOTT represented the Corporation.

Mr. HORRIDGE, in opening the case, explained that, owing to the heavy demand upon the existing supply of water to Birkenhead, which came from wells in the Wirral Peninsula, the sea began to percolate into the wells, and was making the water saline. As a result, the Corporation obtained an Act in 1907 giving them power to construct a dam on the Alwen, in the Alwen and Brenig Valley, Denbighshire; and it was proposed to construct a reservoir capable of supplying 10,807,000 gallons of water per day, of which 3,600,000 gallons would be used for compensation. The Brenig reservoir would have a total available daily capacity of 5,205,000 gallons. It was proposed to take 11,313 acres for the watershed and reservoirs; and of this total the claimant owned 3343 acres. The water area of the Alwen reservoir was to be 340 acres, and it would be 2½ miles long, with a storage capacity of 2140 million gallons. The claimant's estate possessed special adaptability for the purposes of a water undertaking. It had an ideal formation; there was stone on it with which to construct reservoirs; and the foundations could be reached within a short distance of the surface. It was moorland, and therefore free from sources of contamination. Owing to the position of the estate, the Corporation would have an exceptionally short distance to take the water. Another advantage was that the estate was surrounded by other water-bearing areas, which added to its value, because these could be utilized. From an engineering point of view, the site possessed enormous advantages, since the water would be conveyed by gravitation along the shortest route to Birkenhead. The only tunnelling required was 381 yards, and only the River Dee had to be crossed. The large towns which were overtaking their water resources were looking to such estates as the one in question for increasing their supplies. With regard to the principles of his valuation, he had added 50 per cent. to the worth of the reservoir site for the surrounding filtration beds. The claimant was also entitled to compensation for the taking of his sporting rights. With regard to minerals, he was entitled to be paid for the additional value of the stone on the estate. For 1672 lineal yards of easements he could claim at the rate of 7s. 6d. per yard. He was entitled to £10 per acre above the agricultural value of the land in respect of the water-bearing character of the soil, and to 10 per cent. on the value of the estate in respect of compulsory purchase. The estate was in such a position that there must be competitors for it; and he (Counsel) asked the Umpire to take this circumstance into account in determining the sum to be paid by the Corporation.

Evidence was then given in support of the claim.

Mr. *E. W. Dixon*, of Leeds, said there was no such place as the claimant's for obtaining a water supply and making reservoirs on the east side of Snowdon. He expressed the opinion that the whole Wirral Peninsula would be obliged at some time to have to go to the same source for its supply; and there was ample room for extension. The Alwen reservoir, when completed, would be the largest at that height in the kingdom. As an item of enhanced value, he pointed out that the tunnelling would only be a few hundred yards, while Birmingham had to tunnel 13 miles, Manchester 14, and Liverpool 4. This site possessed all the elements of special adaptability. The large towns in South Lancashire had at present practically exhausted their supplies. Stalybridge, Ashton-under-Lyne, Dukinfield, and others, were all constructing their last reservoirs, and had no hope—inside the Mersey watershed—of getting any further surface water supply. If the present growth went on as it had done, he was confident that these districts would have to go to Wales for their supply in the future; and the Wirral Peninsula was also a competitor for the Welsh supplies.

In cross-examination by Mr. LESLIE SCOTT, witness said that, assuming he was the owner of a site in Wales suitable for reservoir purposes, and had received no inquiry for it for a reservoir—no intimation that the water authority had been requested to make arrangements for the sale of the site—and, on the other hand, he received an offer for it for a grouse moor and pastoral purposes, and could sell it at top market value, if he thought that some years hence an authority would come and ask him to sell, he would hold on to his land in the event of such a probability, if it were a matter of twenty years, unless compelled to sell through poverty.

Re-examined: Outside the site in question, there was not one that a purchaser would look at for water-works purposes. He could not conceive any better scheme for Wirral than that with which the Birkenhead Corporation were concerned. From the point of view of quality, quantity, and ultimate cost, there was nothing cheaper; and nowhere in North Wales was there an equivalent site to the Alwen.

Mr. *T. T. Wainwright* said he valued the reservoir site, together with surroundings, at £1 an acre per million gallons of water stored in the reservoir. This, taken on the 4 per cent. table, 25 years' purchase, represented capitalized £25 per acre per million gallons. Then he found that the site was equal to 6·29 million gallons of water per acre, which represented a sum equivalent to a value of £157 per acre. The land to be taken was 2029 acres. He did not think he had ever seen land better adapted than this for the storage of water. Estimating the land for the reservoir and surroundings at £157 per acre, he valued this portion of the estate at £59,817. The watershed was an admirable one, and fully worth £10 an acre for this purpose, in addition to its

value as agricultural land. The watershed lands he valued at £21,795; making a total of £81,612. Then there were 927 acres of good shooting to be taken, which he put at 2s. an acre, £334 per annum, capitalized at £5412 10s. This sum included depreciation to the value of the 1300 acres remaining. Including wayleave for pipes, his total was £90,869, and adding 10 per cent. for compulsory purchase, brought it up to £99,758, which he thought was the compensation that should be paid to the claimant. He was unable to point to another water area which could so cheaply and adequately supply the needs of Wirral as the one in question.

Witness was cross-examined at some length by Mr. BALFOUR BROWNE in regard to his valuation of the sporting rights connected with the site; but he defended his figure of 25 years' purchase, and 35 years for the agricultural land. He said he considered the site an extraordinary one for the purposes of water supply.

Mr. *G. N. Yourdi* said there were no geological difficulties in connection with the site, and he did not anticipate any with the bottom of the foundations of the reservoir. Of an average of eight North Country reservoirs, he found the cost to be £147,000 for the storage of a million gallons of water. Estimating the total cost of the Alwen reservoir at £175,000, the cost per million gallons was only £82,000. As a collecting-ground, the site in question was absolutely pure. He placed the 381 acres required for the reservoir and surroundings at £157 an acre, and he added to the value of the remaining agricultural land £10 for water-bearing capacity. The stone on the site he valued at 60,000 cubic yards at 1s. per yard; and his total valuation was £99,758.

Mr. *T. Jones* said, in his opinion, the land in question possessed special adaptability for water-works purposes. The water area of the reservoir was 254 acres, and the surroundings he put down at 50 per cent. extra—reckoning them at £157 an acre. The remaining agricultural land he valued at £16,580; but in this was included a sum of £10 per acre for adaptability as a watershed. The shooting he valued at 2s. an acre over 2039 acres which would be taken, and depreciation to the 1304 acres remaining of the claimant's property he put at 5d. per acre; his valuation for shooting and depreciation being £4925. The wayleave for pipes he priced at 7s. 6d. per lineal yard, £628; and his total for the whole, including 10 per cent. for compulsory purchase, was £99,641. Asked whether it was not becoming increasingly difficult to obtain sites for purposes of water supply, and were not the large towns going more and more to Wales, witness replied that people there feared that all their water would be taken; and therefore there was a natural feeling about it. He should say the site in question was one which would at an early period be sought after for the supply of water for domestic use.

Mr. *J. Clarke*, Mr. *J. Farrer*, and Mr. *F. W. Thompson* gave similar evidence; the last-named witness stating that his valuation of the site, which was an ideal one, was £96,255, exclusive of stone.

Mr. *F. E. Priest*, the Engineer to the Wirral Rural District Council, said that at present, with the exception of Wallasey, the Wirral Peninsula was supplied with water from deep wells. The whole of it was covered with boulder clay and impervious to water, so that the surface water could not be obtained; and the supply to the wells came from the sea in the estuary—the depth of the wells being below sea level. The least distance from the sea at which they could put a well was three miles; and the effect of the increasing demand on the wells was to make the supply saline. He was perfectly certain the present water supply in the Peninsula could not continue very much longer. He knew that Birkenhead made serious efforts to avoid having the present scheme on their hands; but they utterly failed.

Mr. BALFOUR BROWNE then opened the case for the Corporation. He said the owner of the land required was claiming about £100,000, chiefly on the ground of its special adaptability for water-works purposes. The claim raised what was most inappropriately termed "special adaptability;" but he ventured to say this was not only fallacy, but downright absurdity. Special adaptability depended entirely on the point when the want of water would arise. If it was a present want, the land might be worth £150 an acre; but suppose the want did not arise for 33 years, the consideration of special adaptability had gone. It might have been possible, before Birkenhead obtained statutory powers, to make a bargain with Mr. Evans, the other gentleman in the locality, to purchase land. What would they have given then? First of all, he suggested this would be a blackmail value. If Birkenhead was in deadly need of water, it might have given a heavy price for the land; but such a bargain could not have been made except under the authority of an Act of Parliament. They must consider whether the interests of Birkenhead were such that the Corporation must necessarily go to this site. If there were a dozen other sites available, what became of the special adaptability of this one? If Mr. Evans had asked a large sum, Birkenhead would have gone to half-a-dozen other sites equally suitable. How would he prove special adaptability then? There was no competition among corporations or individuals for these sites. He was prepared to show that in this particular locality there were sites which would have suited any one of the districts that had been mentioned. If one wanted to show a market, one must show a demand, and not only a demand but the imminence of demand. If no imminence arose within a period of 33 years, special adaptability went. The claimant's case was founded upon market and competition, and he had failed to make it out. An enormous sum was being asked from the Corporation; and the Court should have regard to the value of this property at the time notice to treat was served.

Evidence was then given on behalf of the Corporation.

Mr. *G. F. Deacon* was the first witness. He said in connection with the water schemes with which he had been engaged he had examined various sources in North Wales, and had known two or three sites for forty years. They largely exceeded the present demand for them, as well as any future demand, so far as one could foresee. He had examined the whole of the cases of the authorities within sixty miles of the site in question, and there is not one within that distance in the least likely to go to Alwen, or anywhere near it, for thirty or forty years; and he was inclined to say for a good deal longer. He made a preliminary report to the Birkenhead Corporation; and in it he said there were about ten schemes which might prove suitable to them. He pointed out in a later detailed report that three of the sites were equal to that at Alwen. A further report was given of nine additional schemes, three of the sites being in Welsh areas. There was another Welsh scheme reported on later. Of the schemes he dealt with, three in Wales were equal to a supply of 18 million gallons per day, and several of the sites were capable of supplying from 10 to 12 million gallons per day. Some of the other sites available were better than the Alwen; they were wider, and the water was of better colour. There was no population within 60 miles of Alwen likely to go there for water. If they wanted sites within this distance, there were some nearer and much more economical.

In cross-examination, witness stated that, in the estimate they had taken, the rate of increase in population would in 1951 give a population for Birkenhead of 207,000 and the Wirral Peninsula of 464,000. When applying to Parliament, 18 million gallons per day was the supply Birkenhead thought it necessary to apply for. Questioned on the evidence he gave before the Parliamentary Committee, he said he told them that, besides Birkenhead, Wirral would require a further supply of water, especially as the population was increasing. The Glen Alwen reservoir in this scheme was intended to supply compensation water entirely. It was correct to say, as he had stated to the Parliamentary Committee, that in course of time—perhaps in fifty years—Wirral would have to go elsewhere than to Wales for water. There were no rivers, no canals, and no suitable wells for the supply of water for trade purposes in Wirral. The sites of the proposed reservoirs were excellently adapted to the supply of water to Birkenhead. They could get good foundations from a water-works point of view. In answer to further questions, witness said he knew Chester demanded compensation water, and got a clause inserted in the Corporation Act. If Wirral had a Water Board and asked for a similar arrangement to be made, there would be no difficulty about it.

In re-examination by Mr. BALFOUR BROWNE, witness said the Corporation scheme was a very good one, and one which would not injure the River Dee or the fisheries, as the Conservators got compensation water. In making his survey for the Corporation, he found a large number of sites suitable for municipal water undertakings.

Sir *Alexander Binnie* stated that he was consulted in 1905 by the Birkenhead Corporation about their water supply, and investigated the Alwen and the Brenig. He did not believe that if any town within fifty miles required water in the next twenty years, seeing that the Alwen could only yield 7 million gallons per day after supplying compensation water, they would go there. A bar would be put on it by the expense of the aqueduct. Other sites in the district were very numerous. He went over many of them, and consulted with Mr. Deacon as to four or five; and recently he had been over them again. He was of opinion that there were other sites in the neighbourhood, not only for reservoirs but for watersheds, amply sufficient for a probable population of 3 million people. When he was first consulted, he considered the scheme of the Corporation one of the best he had ever seen; but then he did not know they would have to give compensation water. It had also been mutilated by the refusal of the Glen Alwen portion of it.

Mr. *Lovell Clare*, a surveyor, said his valuation for land taken was: Agricultural value, £5570; sporting and fishing, £2500; *plus* 10 per cent. for compulsory purchase—making a total, with wayleaves, of £9060, against £99,960 on the other side.

Mr. *Henry Hartley* said he valued the site and compensation at £9171. He did not consider anything should be added, beyond its agricultural and sporting value, on account of special adaptability. With regard to possible competition for the site from Wirral, witness said there was no place in the peninsula which was growing very much except Port Sunlight and part of Lower Bebington.

Mr. *J. T. Wallis*, Surveyor to the Manchester Ship Canal, said he had considered the question as to whether the owner of the site would get more money for his land than its agricultural value because at some future time a reservoir might be put upon it, and he was of opinion that he would not. He valued the land, on an agricultural and sporting basis, at £9030, and said it did not possess any additional worth for special adaptability.

Mr. *E. Holmes* said there was no evidence of any reasonable demand for the site in question, there being others in the district; and there was no other than sporting and agriculture value in it. His valuation was the same as that of Mr. Clare.

Mr. *J. T. Wood* said he had visited 21 prospective reservoir sites at the instance of Mr. Deacon, and did not think this one had anything more than agricultural and sporting value. The total of his valuation was £8705. He had added 10 per cent. in respect of compulsory purchase; but it was not his practice to add a like percentage in respect of easements for the pipe-line, because neither landlord nor tenant could be injured by a pipe which ran underground.

This concluded the case for the Corporation.

Mr. BALFOUR BROWNE then addressed the Umpire on behalf of the Corporation. He denied that there was any reservoir value in the site, on two grounds. First of all, there was no real indication that there was any demand for water for any place that could possibly come there; and the claimant's witnesses had not shown that there was any other town in want of water. He therefore suggested, in the second place, that no market had been shown for this commodity. As to vague suggestions that there were populations who were wanting water and that populations generally were increasing, he ventured to say that for this particular site there would never be any demand, even if the suggestion were true. His learned friend (Mr. Horridge) had mentioned several places as possible competitors for the site, and especially Wirral; but Wirral was to be supplied by Birkenhead, and they had also entered into an agreement with Wallasey, and also with the Wirral and West Cheshire Company. Was there really any want of water in the Wirral Peninsula? According to Mr. Deacon, there were 7 million gallons per day available for the population. But, apart from this, there was no evidence to show that Wirral would ever go to this site at all, for there were dozens of others available. If there was no market, there could be no reservoir value. The other side had failed to show any demand, or that there was any special value in the site; and he therefore asked the Court to say that there was nothing in it except its value for agricultural and sporting purposes.

Mr. HORRIDGE, for the claimant, said the questions which stood out were: First, adaptability; secondly, competition; and, lastly, the basis of valuation. With regard to the first, he said that, even if there

were competing sites and sellers, this did not in the least touch the question of adaptability; and if it existed, it only related to the question of a possible reduction of value of their site. The real question in the arbitration was that Birkenhead had taken the best site it could get in Wales, close to populous Lancashire towns, and that this gave special adaptability to the site. He thought it would be treating the Corporation generously if it were assumed that in four or five years there would competitors for this land. Wirral and Chester had protested that the site was the natural one for their supplies; and Mr. Deacon had admitted the same thing, and had shown that there were possible purchasers within a reasonable time. The Corporation had chosen deliberately to throw the whole die of their case on agricultural value. The first reason was that if they did this their valuation would be a low one; and, secondly, if they adopted any other method, their valuation would be as high as, or higher than, that of the claimant's own witnesses.

The UMPIRE announced that, in view of the magnitude of the interests concerned, the award would be made at an early date.

At the meeting of the Birkenhead Town Council last Wednesday, the Chairman of the Water Committee (Alderman Bloor) announced Sir Edward Clarke's award in the arbitration proceedings reported above. He said it was £26,168 for land, and £350 for easements; making a total of £26,518. He was satisfied with the award, because he felt that it was as much as the owner ought to get; and, in view of the large claim of about £100,000, supported as it was by most valuable expert evidence, the Council had every reason to be pleased that this figure had been reduced to the amount mentioned. The award had come within the Committee's estimate of the cost.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Informal Meeting in Glasgow on Wednesday—which, by the way, was one of the largest yet held—was opened with the pathetic incident of the inauguration of the M'Gilchrist Memorial. So rapidly does time wing its flight, that it was almost startling to be reminded that it is nearly three years since Mr. M'Gilchrist died. The principal figure in the ceremony was Provost Macfarlan, of Dumbarton, who was a lifelong friend of Mr. M'Gilchrist's, and who acquitted himself admirably. The memento is a beautiful piece of workmanship. The medallion was reproduced in the "JOURNAL" a year ago; but it may be described here again. It consists of an oval plate, of gold, with a portrait of Mr. M'Gilchrist engraved in the centre. The border surrounding it is an open design in thistles, with the monogram "G.M." (gas managers) at the upper and lower shoulders, a gasholder at the top, crossed flaming torches at the bottom, and Roman lamps at each side. The arrangement by which the medallion is attached to the chain is in the form of a flat gas-flame. Round the medallion, and separating it from the ornamental border, there is a raised band, upon which is the inscription—"Informal Meeting of Scottish Gas Managers, Inaugurated by James M'Gilchrist, Dumbarton, 1884." The portrait on the medallion is a much more expressive likeness of Mr. M'Gilchrist than was the original sketch submitted last year by the maker—ex-Lord Provost David Macgregor, of Perth. Mr. Macgregor was a specially distinguished artist in gold engraving. Alas for the mutation of human affairs, while kind things were being said of him at the Informal Meeting in Glasgow, he was lying dead at Bridge of Earn, having died that morning, and no one in the meeting being aware of the event. On its business side, the meeting was a great success. Mr. Vass, in his Presidential Address, covered numerous subjects of interest to managers; and he did it so successfully that a very prolonged discussion ensued. It is always evidence of an auditory having been appealed to when those who are expected to discuss the observations rise spontaneously to make their remarks. Such was the case on this occasion; and Mr. Vass is entitled to take to himself the compliment that, as President of the Informal Meeting, he laid before his brethren subject-matter which touched them, on account of its applicability to their individual conditions and needs.

Mr. W. M. Burke, the Gas Treasurer of Dundee, has prepared a statement regarding the relative prices of gas as supplied through prepayment and ordinary meters. He states that prepayment meters were instituted in Dundee in 1897, and the price then charged for gas supplied through them was 3s. 9½d. per 1000 cubic feet, which was 7½d. above the rate charged for ordinary meters. The prepayment meters in use are still set at 3s. 9½d. Discount at the rate of 5 per cent. is allowed on gas consumed through ordinary meters; but there is no equivalent in the case of prepayment meters. The number of prepayment meters in use at March 31 was 15,488. The price of gas this year is, through ordinary meters, 2s. 4d. per 1000 cubic feet, and 2s. 8d. through prepayment meters—a difference of 4d. Mr. Burke explains to the Council that the increased charge is required in consequence of (1) the increased cost of collection—prepayment meters being inspected six times a year, as against three times with ordinary meters; (2) ordinary meters are fitted up by outside plumbers, but the Gas Commissioners fit up all prepayment meters and stopcocks free; and (3) prepayment meters are dearer than ordinary ones, the prices being, 2-light, ordinary, 19s. 1d., prepayment, 32s. 5d., and 3-light 23s. 4d. and 34s. 1d. respectively. The difference between the present charge of 2s. 8d. and 3s. 9½d., at which the meters are set, is returned to the consumers in the form of a rebate; this system having been inaugurated in 1903-04, previous to which time no rebate was allowed. For the year ending April 30, 1908, the consumption of gas through prepayment meters was 114,243,000 cubic feet, which, at 2s. 10d. per 1000 cubic feet, realized £16,184. At the ordinary rate the revenue would have been £14,280—a difference of £1904. It is added that the excess charged in the case of prepayment meters is 7½d. in Aberdeen, 7d. in Glasgow, 1s. 2d. in Edinburgh, 5d. in Perth, and 1s. 1d. in Paisley.

In the Peterhead Town Council on Monday, the Gas Committee reported that they had received a deputation from the Council of the Peterhead and District Friendly Societies with reference to the charge made for gas used by consumers who have prepayment meters, as compared with that to consumers who have ordinary meters, and that the Convener replied to the points raised by the deputation, basing his reply on information contained in a report by the Gas Manager, in which it was stated that he had gone into the matter very carefully, and that his investigations had shown that at present the prepayment-meter consumer has a distinct advantage over the ordinary consumer.

The employees in the Aberdeen Corporation Gas Department held their annual reunion in the Richmond Café, Aberdeen, on Saturday last. Mr. S. Milne, the Engineer, presided, and expressed his pleasure at meeting with the workers in a social capacity. An enjoyable evening was spent in dancing, songs being interspersed, and supper served during an interval in the proceedings.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 8.

Sulphate of Ammonia.

Quietness has prevailed throughout the week; there being but few direct orders from abroad, and buyers who may have contracts to cover for April delivery being in no hurry to effect their purchases. The large makes, having for the most part been sold in advance, have not been on the market; but the smaller makes have been available, and have only been disposed of at declining prices. So that the closing quotations are £11 8s. 9d. per ton f.o.b. Hull, £11 11s. 3d. per ton f.o.b. Liverpool, and £11 13s. 9d. per ton f.o.b. Leith. In the forward position, the situation is unchanged, and no important first-hand business has transpired.

Nitrate of Soda.

Holders continue to maintain a firm attitude; the spot quotation for 95 per cent. being 10s. 4½d. per cwt., and that for refined quality 10s. 7½d.

LONDON, *April* 8.

Tar Products.

Markets have been firm all round throughout the past week. Pitch has been very steady, and some good figures have been paid for both prompt and forward delivery; but the Continent are not replying to the full extent of the rise which has taken place here. Creosote is quiet; but makers are in most cases well sold, and it is known that there is still a large quantity to be purchased for delivery over the summer. Benzols and toluol are dull, and sales very difficult to negotiate. Solvent naphtha is steady. For heavy naphtha, there is little inquiry. Carbolic acid is rather firmer, several dealers being short of 60's on the east coast. Crystals are unchanged. Naphthalene is dull; and salts are in fair demand at good prices. Little alteration is to be looked for during the next week or ten days owing to the holidays.

The average values during the week were: Tar, 13s. 3d. to 17s. 3d. *ex* works. Pitch, London, 23s. 6d. to 24s.; east coast, 23s. to 23s. 6d.; west coast, 22s. 6d. to 23s. 6d. f.a.s. Mersey ports. Benzol, 90 per cent., casks included, London, 6d.; North, 5½d.; 50-90 per cent., casks included, London, 6½d.; North, 6d. Toluol, casks included, London, 8½d. to 9d.; North, 7½d. to 8d. Crude naphtha, in bulk, London, 3½d. to 3⅝d.; North, 3d. to 3¼d.; solvent naphtha, casks included, North, 9d. to 9½d.; London, 10½d. to 11d.; heavy naphtha, casks included, London, 11d. to 11½d.; North, 10d. to 10½d. Creosote, in bulk, London, 2⅝d. to 2¾d.; North, 2¼d. to 2⅜d. Heavy oils, in bulk, 3d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 0½d. to 1s. 0⅝d.; west coast, 1s. to 1s. 0½d. Naphthalene, £4 10s. to £8 10s.; salts, 37s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market is quiet, and there has been very little business during the last few days. To-day upon Beckton terms the price is £11 10s., and for Beckton prompt £11 17s. 6d.; while the ordinary London makes are sold at £11 8s. 9d. In Hull, the price is £11 10s., and in Liverpool £11 10s. to £11 12s. 6d. In Leith, £11 15s. is quoted.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade is in some measure interrupted by the holidays; and though there has been a heavy production in the last few days, it will now be light until the effect of these holidays is past. In the steam coal trade, best Northumbrians are from about 11s. 6d. to 12s. per ton f.o.b.; but there is little coal free for prompt sale. Second-class steams are from 9s. 6d. to 10s. 6d., and steam smalls from about 5s. to 6s. per ton—the latter being firm with a growing request. In the gas coal trade, the demand is fairly steady; but the consumption shows a falling off, both locally and generally. Prices of Durham gas coals are from about 9s. to 10s. 3d. per ton f.o.b., according to quality, for the usual classes, and up to 10s. 6d. for "Wear specials." There have been some sales of gas coals for shipment over the season, and the prices that have been generally paid seem to be such as to leave from 9s. to 9s. 9d. per ton f.o.b. There are other similar contracts now in the market that seem likely to be settled on terms that are very close to those named. The output of gas coal appears to be well taken up for this season of the year; and the prices are steady. Coke is little changed; and gas coke is maintained in price, the output being less. Good gas coke is from 13s. to 13s. 3d. per ton f.o.b.

Scotch Coal Trade.

Trade has improved a little, in response to a better foreign demand, and prospects are brighter than they have been for some time. Prices have not moved much; but it is probable that the inquiries for gas coal have had the effect of keeping them higher of late than the state

of the market warranted. The quotations are: Ell 8s. 9d. to 10s. 3d., splint 9s. 6d. to 9s. 9d., and steam 9s. to 9s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 276,725 tons—a decrease of 10,436 tons upon the previous week, but an increase of 18,720 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,185,445 tons—an increase of 238,984 tons upon the corresponding period.

Gas v. Electricity for Public Lighting at Lewisham.

The Works and Highways Committee of the Lewisham Borough Council reported last Wednesday that they had considered suggestions submitted by the Engineer of the South Metropolitan Electric Light and Power Company, with general details of alternative schemes for street lighting, together with approximate estimates for the different systems proposed. The Chairman and Borough Surveyor investigated the matter, and wrote as follows: "The Engineer of the Company suggests three alternative schemes of lighting—(1) by arc lamps which should be alight all night; (2) by arc lamps as in system (*a*), but to be extinguished at midnight, after which two incandescent lamps of 22-candle power would be provided at each standard; (3) by incandescent lamps fitted with two 32-candle power lamps of the metallic filament type. The first and second schemes are quite out of the question, as the first costs £15 15s. per lamp per annum and the second £8 7s. 6d. per lamp. The third system would cost £2 17s. 6d. per lamp per annum against the present charge of £2 9s. 2d. for No. 2 incandescent Kern gas-burners. The Electric Light Company's estimate is for 3650 hours per annum. The South Metropolitan Gas Company light the lamps for 4200 hours, and the South Suburban Gas Company for 3800 hours. The Gas Companies' price includes all costs of maintenance, lighting, extinguishing, &c. The Electric Light Company's estimate does not include trimming lamps, painting posts, switching on and off, the renewals of incandescent lamps, &c. This would further increase the cost very materially. The advantage claimed by the Electric Light Company is that there would be an increase of 20 per cent. over the present amount of light; but this is problematical, and is not calculated when the mantles on the gas-burners are new. There are upwards of 3000 No. 2 Kern burners in the gas-lamps in the borough, and the increase in the cost of lighting would be more than £2000, without any definite advantage. The cost of the installation, even of the third system, would be approximately £15,000." In view of the foregoing communication, the Committe have decided not to take any further action in the matter.

"Richmond's Gas-Heated Furnaces and Laboratory Appliances" is the title of a 12-page catalogue just issued by the Richmond Gas Stove and Meter Company, Limited. The pamphlet shows several classes of crucible and muffle furnaces suitable for workshop, studio, and laboratory purposes. Besides furnaces for melting gold, silver, and brass, there is one for lead—a most useful piece of gas apparatus for electrotypers and stereotypers. The entirely new and patented principle of construction of these furnaces is fully explained by sectional drawings and half-tone illustrations.

Producer Gas Success.—The Power-Gas Corporation, Limited, of Stockton-on-Tees, supply some interesting data regarding a 6000 H.P. Mond gas plant supplied to Messrs. Butterfield and Swire's Dockyard at Hong Kong. The four gas-engines were supplied by a Middlesbrough firm, and are employed in driving dynamos directly. The plant is used for power and furnace work—forge furnaces, plate reheating furnaces, bow reheating furnaces, 67 feet long and 3 feet wide, brass melting, plate annealing, and various other such purposes. The plant after running for a year underwent final trials last December; and the Stockton Company have received eminently satisfactory certificates and data regarding the results. Using Chinese bituminous fuel, the trials of several days' duration averaged as follows: Full load, 0·92 lb. per brake-horse-power-hour; three-quarters load, 1·02 lbs. per brake-horse-powar-hour; half load, 1·125 lbs. per brake-horse-power.

Gas v. Electricity at Torquay.—After considerable experience of other systems of charging, the Electric Lighting Committee of the Torquay Town Council decided at their last meeting to adopt a flat-rate of 4½d. per unit for current supplied for private lighting. In asking the Town Council last Tuesday to approve of this change, Mr. Blackler, the Chairman of the Committee, said that it would mean a loss to the undertaking of £500 a year; but they could afford it, and electricity would now be cheaper than gas. Mr. Young said the latter assertion could not be maintained. Gas was certainly cheaper than electricity, and for public lighting gave better results. The Gas Company could give a better light than that now supplied, and charge £600 or £700 a year less for it, which would mean the saving of a penny rate. Alderman Mortimer said that it was owing to the results obtained by supplying electric power to the tramways that they were able to consider the adoption of a flat-rate. Some of the small consumers would have to pay a little more; but they would be able to read the indicators for themselves, and it would be more satisfactory in every way. The Council agreed to the recommendation.

New Purifiers for the Teignmouth Gas-Works.—Among the minutes of the Gas Committee presented at the meeting of the Teignmouth Urban District Council last Tuesday, was one stating that the Gas Manager (Mr. J. A. Gray) had produced the plan and section of new purifiers for the gas-works, the cost of which he estimated at £1200. The Committee approved of the plan and section, and instructed the Manager to forward a specification and general description of the work to the Local Government Board, with a view to obtaining their sanction to a loan of £1200. The Committee also passed a vote of thanks to Mr. W. J. B. Banbury for his services as Chairman and for the great interest he had taken in the gas-works, and expressed their regret at his retirement from the Council and the consequent loss of his services to the Committee. Mr. Wheatley, who moved the adoption of the report, said that very great improvements had been carried out at the gas-works during the years that Mr. Banbury had been Chairman; and both in regard to the works themselves and their financial position, things were in a much more satisfactory state than formerly. They were looking forward to a reduction of the price of gas shortly. Mr. Gray said he was sorry to lose Mr. Banbury as Chairman of the Committee, for he had received very great help from him. Mr. Banbury, in reply, expressed the hope that the undertaking would continue to prosper, and the gas become cheaper every year.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 79.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 15	10	Alliance & Dublin 10 p.c.	18—18½	–½	5 8 1
298,955	10	,,	7	Do. 7 p.c.	12⅞—13¼	..	5 5 8
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	9*—100	..	4 0 0
200,000	5	Oct. 29	6⅛	Bombay, Ltd.	5⅞—6	+⅛	5 8 4
40,000	5	,,	6⅛	Do. New, £4 paid	4¼—4½	+⅛	5 15 6
50,000	13	Feb. 25	14	Bournemouth Gas & Water 6 p.c. Pref. 6 p.c.	284—294	..	4 14 11
51,810	13	,,	7		16⅛—16¾	..	4 3 7
53,200	10	,,	6		15⅜—16	..	3 15 0
380,000	Stk.	,,	12½	Brentford Consolidated	247—250	+2	5 0 0
300,000	,,	,,	5⅛	Do. New	186—189	+1	5 0 6
50,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	+2	4 0 8
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	101—103	..	3 17 8
220,000	Stk.	Mar. 12	10⅝	Brighton & Hove Orig.	210—213	+1	5 1 0
246,320	,,	,,	7½	Do. A Ord. Stk.	152—155	+2	5 0 0
460,000	20	Oct. 15	10	British	42—43	..	4 13 0
109,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c.	114—117	..	5 2 7
165,700	,,	,,	4½	Do. do. 3½ p.c.	85—87	..	5 3 6
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	12⅞—13¼	..	5 5 8
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
100,000	13	—	—	Cape Town & Dis. Ltd.	4⅝—5⅛	..	—
100,000	13	—	—	Do. 4½ p.c. Pref.	4⅝—5⅛	..	—
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	48—50	+1	6 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	77—79	+1	5 13 11
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109—111	..	4 10 1
1,493,280	Stk.	Mar. 12	5⅛	Commercial 4 p.c. Stk.	106—108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	101—103	..	4 17 1
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800,000	Stk.	,,	6½	Continental Union, Ltd.	101—103	..	6 6 3
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—141	..	4 19 3
492,270	Stk.	—	5	Derby Con. Stk.	121—123	..	4 1 4
55,[illegible]	..	—	4	Do. Deb. Stk.	103—105	..	3 16 2
145,995	,,	Mar. 31	5	East Hull 5 p.c. Ord.	96—98*	..	5 2 0
486,290	10	Jan. 28	12	European, Ltd.	23¾—24¼	..	4 19 0
354,060	,,	,,	12	Do. £7 ics. paid.	17½—18¼	..	4 18 5
15,161,515	Stk.	Feb. 11	4/10/8	Gas light and Coke 4 p.c. Ord.	102⅜—103½	+⅛	4 7 6
2,620,000	,,	,,	3⅛		88—89	..	3 18 8
3,799,735	,,	,,	4		104—106	..	3 15 6
4,193,975	,,	Dec. 11	3		83—86	..	3 9 9
258,740	Stk.	Mar. 12	4⅜	Hastings & St. L. 3½ p.c.	93—95	..	5 0 0
82,500	,,	,,	6¼	Do. do. 5 p.c.	117—120	+7	5 4 2
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	18—18½	..	5 18 11
123,500	Stk.	Mar. 12	6½	Ilford "A" and "C"	134—136	..	4 15 7
65,780	,,	,,	5	Do. "B"	103—105	..	4 15 3
51,000	,,	Dec. 30	4	Do. 4 p.c. Deb.	102—104	..	3 16 11
4,940,000	Stk.	Nov. 13	8	Imperial Continental	182—184	..	4 7 0
473,600	Stk.	Feb. 11	3½	Do. 5½ p.c. Deb. Red.	95—97	+1	3 12 2
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	117—119	..	5 0 10

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
501,000	Stk.	Feb. 25	10	Liverpool United A.	222½—224½	..	4 9 1
718,100	,,	,,	7	Do. B	169½—171½	..	4 1 7
306 083	,,	Dec. 30	4	Do. Deb. Stk.	105—107	..	3 14 9
55,000	5	Dec. 11	6	Malta & Mediterranean	4⅝—5	..	6 0 0
560,000	100	Apl. 1	5	Met of 5 p.c. Deb.	100—102*	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102*	..	4 8 3
541,920	20	Nov. 13	3⅛	Monte Video Ltd.	12¼—12¾	..	5 9 10
1,775 892	Stk.	Feb. 25	4⅜	Newc'tle & G't sh'd Con	107—108	..	4 3 4
518,795	Stk	Dec. 30	3½	Do. 3½ p.c. Deb.	91—93	..	3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.	19⅜—20	..	5 0 0
55,940	10	,,	7	Do. 7 p.c.	13—13⅜	..	5 3 8
300,030	Stk.	Nov. 27	8	Oriental, Ltd.	140—142	..	5 12 8
60,000	5	Mar. 31	8	Ottoman, Ltd.	6—6¼*	..	6 8 0
3,830	53	Feb. 25	13	Portsea Island A.	135—137	..	5 0 7
60,000	50	,,	13	Do. B.	129—131	..	4 19 3
100 000	50	,,	12	Do. C.	119—121	..	4 19 2
114,800	50	,,	10	Do. D and E.	101—103	..	4 17 1
398,490	5	Oct. 29	7	Primitiva Ord.	6½—6¾	..	5 7 8
796,880	5	Jan. 28	5	Do. 5 p.c Pref.	5—5⅛	..	4 15 3
483,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
1,100,000	10	Oct. 15	8	River Plate Ord.	13⅜—14⅛	..	5 12 3
312,650	Stk	Dec. 30	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
250,000	10	Mar. 31	8	San Paulo, Ltd.	13½—14*	..	5 14 4
62,500	10	,,	—	Do. 6 p.c. Pref.	11⅜—12*	..	5 0 0
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49⅜—50½	..	4 19 0
135,000	Stk	Mar. 12	10	Sheffield A	236—238	..	4 4 0
269,98[illegible]	,,	,,	10	Do. B	236—238	..	4 4 0
523,50	,,	,,	10	Do. C	234—236	..	4 4 9
50,000	10	Oct. 29	10	South African	14—14½	+½	6 17 11
6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.	124—124	+1	4 6 0
1,895,445	,,	Jan 14	3	Do. 3 p.c. Deb.	85—86	..	3 9 9
209,82[illegible]	Stk.	Mar. 12	8	South Shields Con. Stk.	152—154	..	5 3 11
605,000	Stk.	Feb. 25	5½	S'th Suburb'n Ord. 5 p.c.	120—122	..	4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	+2	4 0 8
117,058	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	124—126	..	3 19 4
502,310	Stk.	Nov. 13	5	Southampton Ord.	109—111	..	4 10 1
120,000	Stk.	Feb. 25	6¾	Tottenham A 5 p.c.	132—134	..	5 0 9
423,940	,,	,,	5¾	and B 3½ p.c.	109—111	..	4 14 7
149,470	,,	Dec. 30	4	Edmonton 4 p.c. Deb.	101—103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	8⅞—9¼	..	8 13 0
149,900	10	Jan.	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	105—107	..	4 13 6
255,66 6	Stk.	Feb. 25	6½	Wands- A 5 p.c.	134—133	..	4 17 9
79,416	,,	Dec. 30	3	worth 3 p.c. Deb. Stk.	72—74	..	4 1 1
893,172	,,	Feb. 25	5¼	West Ham 5 p.c. Ord.	118—121	+1	4 6 9
210,000	,,	,,	5	Do. 5 p.c. Pref.	125—127	+1	3 18 9
253,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	107—109	+2	3 13 5

Prices marked * are "Ex div."

Reduction in Price in South London.—The last accounts furnished to the consumers of the South Metropolitan Gas Company were accompanied by the welcome announcement that the price of gas will be reduced from the date of reading the meters at Midsummer next. Further particulars are to be issued in due course.

Water Divining at North Sunderland.—A remarkable instance of water divining has occurred at North Sunderland. Burn House, now the property of Mrs. M'Dougle, has been without water for many years; and it was contemplated to lay on a supply from the same source as that which serves North Sunderland. It occurred, however, to the agent to engage the services of a water diviner, and one visited the farm. A spot was soon discovered where he said water would be found at a distance of 15 feet from the surface. When a depth of 14 ft. 6 in. was reached, a plentiful supply of water issued from a sandstone bed, and rose to within a foot of the surface. There was enough for two or three farms. A well has been sunk; and the sinker states that it is the most successful he has ever been interested in.

River Plate Gas Company, Limited.—The report of the Directors of this Company for the year 1908 shows that the profit is £125,948, to which has to be added receipts from other sources and the amount brought forward, which together amount to £158,240. After payment of all fixed charges, making the usual ample allowance for bad and doubtful debts, and providing fully for the upkeep of the works, mains, &c., there remains £132,987. The interim dividend paid in October last, of 7s. per share (free of tax), absorbed £35,000. The Directors now place £20,000 to the reserve fund, raising it to £205,000, and £2079 to the old-age and pension fund; and they recommend a final dividend at the rate of 9s. per share, making 8 per cent. for the year (free of tax), leaving £30,909 to be carried forward. During the year £24,627 was spent out of revenue on the works and mains, &c., all of which are stated to be in most efficient order. The mains were increased by upwards of 15 miles, making a total of about 466¾ miles; and on balance 3783 new house services were connected with the system.

Suicide by Coal Gas.—At the Westminster Coroner's Court last Tuesday, Mr. John Troutbeck conducted an inquiry with reference to the death of Mr. Urban M. Noseda, aged 54, an art connoisseur and print seller, of King Street, St. James's, who was found dead in his office on the previous day. Sarah Wenham, housemaid to the deceased, said that he had been depressed since the death of his wife, and of late had been drinking very heavily. Mr. F. C. Gibbs, shop assistant, said that upon arriving at business the previous morning he found his master in his easy-chair fully dressed. There was a large heating-stove in the room, and gas was escaping from the burners, which were fully turned on. The front of the stove had been stopped up with cardboard, and pieces of paper had been placed in the crevices of the room, so as to keep the gas in. Dr. Freyberger, who made an autopsy, stated that death was due to gas poisoning, while the deceased was suffering from pneumonia and the effects of chronic alcoholism. The Jury returned a verdict of "Suicide during temporary insanity."

Gas Profits at Matlock Bath.—At the last meeting of the Matlock Bath Urban District Council, the Vice-Chairman (Mr. Reeds), who is also Chairman of the Gas Committee, moved that, as the profits would now permit of it, the Council should make a reduction of 2d. per 1000 cubic feet in the price of gas. A contrary opinion was, however, expressed, that the equivalent to the 2d. reduction should be devoted to the lowering of the general district rates; and it was pointed out that to make the reduction on the gas alone would confer a benefit on outside areas which the Council supply with gas, whereas if it was devoted to the rates the benefit would be general among ratepayers only. The motion was lost.

Swansea Gas Company.—The annual general meeting of this Company was held at the offices on Friday, the 2nd inst.—Mr. J. Glasbrook presiding. The Chairman referred in feeling terms to the late Mr. Thornton Andrews, who had been connected with the Company, as Engineer and Secretary, for fifty years, and said the deceased gentleman was recognized as one of the leading authorities in the gas profession. The continued progress made by the Company during the past year was alluded to, as well as the increase in the sales of gas; and the working of the Company generally was considered highly satisfactory. The usual dividend at the rate of 5 per cent. per annum on the consolidated and ordinary stock was declared.

Gas Workers' Wages at Stockport.—An application made by the lamp-lighters in the employ of the Stockport Corporation asking the Gas Committee to grant them seven days holiday per annum with full pay (23s.), instead of 20s. as at present, has been refused by the Gas Committee; and that decision was confirmed at the Council meeting last Wednesday by 27 votes to 15, after some discussion. The Mayor (Mr. J. Fernley J.P.), in opposing an amendment to refer the matter back, said it might appear to be a very small question in itself, as there were only 26 or 27 lamplighters in the employ of the department; but they had to consider the influence which the granting of such a concession would have on the other gas-works employees, numbering between 400 and 500. The subject of wages was settled some years ago; and, in his opinion, it was unfair to keep bringing up these small matters to try to get them through.

Leeds Gas-Workers' Wages.—At the last meeting of the Leeds City Council, Mr. Badlay called attention to a resolution of the Gas Committee adopting a Consultative Committee's resolution declining to accede to a request for increased wages from employees of the Gas Committee. These men, he said, had only received a rise of 4d. per shift during the past 25 years, despite the decreased purchasing power of money. During the period named, the salaries of the higher officials had increased some hundreds of pounds. The men were now paid 5s. 2d. a shift, and were asking for a slight concession. Mr. Ratcliffe did not agree that the concession asked for was slight. If granted, it would involve £7000 or £8000 a year. Alderman Wilson said that, with thousands ready to take the men's jobs, there was no case for an advance. Besides, "the industry was a decaying one to some extent, as the sale of gas was diminishing."

Recognition of Merit!

SHEFFIELD SMOKE ABATEMENT EXHIBITION.

Four First Class Diplomas

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The "Wizard" Gas Fire, with the Patent "Thermo" Fire front, has recently been supplied to H.R.H. the Prince of Wales at Marlborough House.

JOHN WRIGHT & CO.,
Essex Works,
BIRMINGHAM.

191.

Danger of Paraffin Lamps.—Dr. G. Danford Thomas held an inquest at St. Pancras last week on Mabel Annie Dominy, aged 15, a domestic servant at a boarding-house in Guilford Street, Bloomsbury. While she was putting out the light in her bedroom, the lamp fell to the floor, and its porcelain reservoir was smashed, with the result that her hair and nightdress caught fire. The girl ran into the dining-room, and before the flames could be extinguished she was severely burnt. She was removed to the Royal Free Hospital, where she died within eight hours of her admission. Mr. Alfred Butler, a London County Council inspector under the Petroleum Act, said that a perfectly safe oil-lamp had not yet been devised. The Jury, in returning a verdict of "Accidental death," expressed the opinion that in servants' bedrooms only gas or metal lamps should be used.

Quality of Gas at Cheltenham.—The minutes of the Electricity and Lighting Committee for the last meeting of the Cheltenham Town Council stated that a memorial had been presented signed by over 200 residents and householders protesting against the inconvenience and annoyance to which they were subjected owing to the impurity and inferior quality of the gas now supplied, which, in their opinion, though nominally cheap, was practically very expensive. The effect was most felt by the poorer members of the community, owing to the necessity for alteration of burners and constant renewal of mantles. The memorialists asked the Corporation to use their influence to endeavour to obtain a remedy for the evil, which had a detrimental effect on the letting of houses to intending residents. It was resolved that a copy of the memorial be sent to the Gas Company, with an expression of opinion on the part of the Council that it deserved the serious consideration of the Directors with a view to an improvement in the quality of the gas supplied.

Gas-Stoves for Offices.—At the meeting of the Manchester City Council last week, Alderman Gibson moved the adoption of a recommendation of the Gas Committee on the supply and fixing at a nominal rental from March 31, 1909, of gas-fires in offices or other premises, approved by the Committee, within the city. He said the proposal was intended to "bring grist to the mill" of the Gas Committee in the increased consumption of gas. The Committee were now supplying gas-cookers at the rate of fifty per day, and augmenting the revenue accordingly. Mr. Wood moved that the proposal be referred back, upon the ground that the present time was inopportune for any such action; while Mr. Singleton advised a reduction in the price of gas all round. Alderman Gibson, in reply, said the idea of the Committee was that offices were the most likely place for gas-stoves. As to reducing the price of gas, did Mr. Singleton know that for years they had been paying £50,000 to £60,000 per annum out of the profits in relief of the rates, and that a reduction of 1d. per 1000 cubic feet in the price would mean a loss of £20,000 a year? The amendment to refer the matter back was carried by 45 votes to 30.

APPLICATIONS FOR LETTERS PATENT.

7452.—Fabry, R. F. F., "Recovering ammonia from coal gas." March 29.
7464.—Leigh, A. G., "Treating liquids in filter-beds." March 29.
7470.—Stern, A., "Production of gas." March 29.
7486.—Anderson, D., and Worsfold, J., "Gas-lamps." March 29.
7497.—Smith, J., "Shade suspender." March 29.
7514.—Skriwan, E., "Attaching mantles to rings." March 29.
7522.—Giorgi, A., "Lighting and extinguishing gas-lamps." March 29.
7549.—Kirkham, W., "Gas-heated furnace." March 30.
7581.—Duckworth, J., Eddleston, J., and Bleasdale, J., "Regulating the supply of gas in mills, workshops, and like places." March 30.
7615.—Pieplu, H. M., "Production of gas." March 30.
7629.—Chrisman, H., "Gas-meters." March 30.
7707.—Darke, C., "Acetylene generators." March 31.
7710.—Calvert, G., "Gas-stoves." March 31.
7711.—Ede, E. P., and Kempton, C. H., "Inverted burner." March 31.
7780.—Duff, A. B., and Gas Power and Bye-Products Company, Limited, "Gas-producers." April 1.
7782.—Johnson, J., "Emergency device or stopping holes in damaged pipes." April 1.
7783.—Harris, W., and Fox, G. E., "Acetylene apparatus." April 1.
7815.—Boucher, A. L., "Gas-stoves." April 1.
7827.—Keith, J. & G., "Electrical ignition devices for gas-lamps." April 1.
7844.—Denison, J. R., Preussner, J. F., and Banks, J. W., "Gas-singeing machines." April 1.
7929.—Prew, C., "Alarum clock provided with mechanism for automatically turning on or off gas or other cocks at predetermined times." April 2.
7941.—Schwabacher, H., "Production of air gas." April 2.
7947.—Restler, J. W., "Valves and cocks." April 2.
7975.—Robinson, J., "Water-tight and air-tight joint." April 3.
7976.—Marz, J., and Armstrong, H. F., "Gas-stoves and ovens." April 3.
7977.—Turnbull, F., "Conveyor for coal or coke." April 3.
7988.—Burnett, C., "Cars for transporting coke." April 3.
8027.—Dransfield, J., "Hooks for securing gas or other pipes." April 3.
8038.—Chatwin, A., J., & T., and Partridge, H. E., "Facing pipes for the purposes of making joints." April 3.

The Tredegar Urban District Council have decided to apply to the Local Government Board for sanction to borrow £10,000 for carrying out extensions to the gas-works. The tender of Messrs. Drakes Limited, at £650, for new retort-settings was accepted, and that of Messrs. Willey and Co., at £885, for purifiers.

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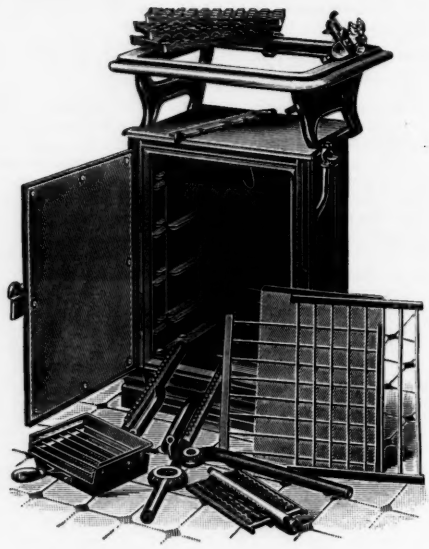

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(2) OVEN BURNERS
(3) BURNER CARRIER
(4) GAS BAR

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We learn from Mr. E. J. Field, the Secretary *pro tem.*, that the registered office of the Amman Valley Gaslight and Coke Company, Limited, is now the Gas-Works, Ammanford, Carmarthenshire—not in London.

Mr. J. A. Doran, the Chairman of the Belfast Gas Committee, has given notice that he will move at the next meeting the following resolution: "That in view of the fact that the Gas Committee gave the Electric Committee on March 27, 1903, £32,500, and that the Electric Committee, though, so far as we know, they are not making any profit on their business, yet are competing for business both private and public against the Gas Committee, who are largely contributing to the reduction of the rates, this Committee desire the Corporation to consider the advisability of placing the electric concern under the Gas Committee, as it was originally."

In discussing the Budget statement made by Mr. Hayes Fisher, the Chairman of the Finance Committee of the London County Council, at the meeting last Tuesday, Sir John Benn, M.P., mentioned that Birmingham had derived profits from gas, electric lighting, and tramways, and in consequence had been enabled to reduce the rates by 2d. in the pound. The Hon. W. R. W. Peel, M.P., stated that the Municipal Reform Party, of which he was leader, did not favour the idea that people who used the tramways should pay higher fares in order to benefit other ratepayers. He advised Sir John Benn to be careful how he tried to acquire the gas undertakings in London, which were profit-sharing concerns, as a great many of the workpeople employed by the Gas Companies had shares, and also had votes. He advised him, therefore, not to make an attack upon the Gas Companies' undertakings in the Metropolis until these gentlemen had sold out.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER-MANAGER. Shipley Gas Department. Applications by April 17.

WORKING MANAGER. Meldreth and Melbourne Gas and Water Company, Norfolk Street, London, W.C.

Situations Wanted.

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PURIFIERS, CONDENSERS, STATION METERS, EXHAUSTERS AND ENGINES, AND SCRUBBERS. Darling and Co., Glasgow.

PURIFIERS. Hexham Gas Company.

RETORT FITTINGS, CONDENSER, SCRUBBERS, EXHAUSTERS, PURIFIERS. Cardiff Gas Company. Tenders by May 1.

Gas-Works for Disposal.

KINGSCLERE GAS-WORKS. By Auction. April 20.

Patent for Disposal.

CHARGING AND DRAWING MACHINERY. C. Eitle, Stuttgart.

Stocks and Shares.

ASCOT DISTRICT GAS AND ELECTRICITY COMPANY. April 27.

GRAYS AND TILBURY GAS COMPANY. April 27.

KIRKHAM, HULETT, AND CHANDLER. April 27.

SOUTHEND WATER COMPANY. April 27.

Meeting.

IMPERIAL CONTINENTAL GAS ASSOCIATION. Cannon Street Hotel. May 4. 2.30 o'clock.

TENDERS FOR

Benzol (Crude).

BRIDGEWATER COLLIERIES COKE-WORKS. Tenders by April 26.

Coal and Cannel.

EAST RETFORD GAS DEPARTMENT. Tenders by April 30.

INVERNESS GAS COMMISSIONERS. Tenders by April 24.

MOSSLEY GAS DEPARTMENT. Tenders by April 28.

NEWPORT (MON.) GAS COMPANY. Tenders by April 21.

RHYL URBAN DISTRICT COUNCIL. Tenders by April 28.

ROTHERWELL URBAN DISTRICT COUNCIL. Tenders by April 24.

UXBRIDGE GAS COMPANY. Tenders by April 20.

WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 21.

Lime.

INVERNESS GAS COMMISSIONERS. Tenders by April 24

LEEDS GAS DEPARTMENT. Tenders by April 24.

Pipes, Pipe-Laying, &c.

LEEDS GAS DEPARTMENT. Tenders by April 24.

TAUNTON RURAL DISTRICT COUNCIL. Tenders by April 30.

Reservoir Construction.

TAUNTON RURAL DISTRICT COUNCIL. Tenders by April 30.

Retort Castings, &c.

LEEDS GAS DEPARTMENT. Tenders by April 24.

Tar and Liquor.

MITCHAM AND WIMBLEDON GAS COMPANY. Tenders by April 30.

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TAUNTON RURAL DISTRICT COUNCIL. Tenders by April 30.

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WESTBURY, WILTS.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2836 HOLBORN.

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0648.

DESSAU PATENT VERTICAL RETORTS.
FOR list of Installations, see "Journal," March 23, p. I. of Centre.
THE DESSAU VERTICAL RETORT COMPANY,
Care of Mr. CHARLES HUNT, Consulting Engineer,
17, Victoria Street, WESTMINSTER, S.W.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

OXIDE OF IRON (BOG ORE).
ANY QUANTITY. ANY PORT. ANY STATION.
DONALD M'INTOSH,
110, CANNON STREET, LONDON.

DUTCH OXIDE OF IRON.
SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd.,
NYMEGEN, HOLLAND.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON,
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

GAS TAR wanted,
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

KRAMERS AND AARTS WATER-GAS PLANT.
K. & A. WATER-GAS COMPANY, LTD.
39, VICTORIA STREET, S.W.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 28, COLLEGE HILL, LONDON, E.C., and 25, BRIDGE END, LEEDS.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger.
The one Machine which Discharges and Charges at One Stroke.
See Advertisement, April 6, p. II. of Centre.
ALDRIDGE AND RANKEN,
39, VICTORIA STREET, WESTMINSTER, S.W.
Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

SPENCER'S PATENT HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement April 6, p. 5.

SULPHURIC ACID.
SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought.
J. WILSON, Pleasant Grove, York Road, King's Cross, LONDON, N.

"NUGEPE" GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD. 86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

APPLY TO THE
CHAIN BELT ENGINEERING CO.
DERBY, ENGLAND,
FOR REALLY HIGH-CLASS
ELEVATORS AND CONVEYORS
ALSO
DRIVING AND CONVEYOR CHAINS.

"HALLITE" Asbestos High-Pressure Sheeting.
HALLITE DOUGLAS, LIMITED, 106, Leadenhall Street, LONDON, E.C.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

TAR WANTED.
National Telephone 7002. Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS
Albert Chemical Works, BRADFORD, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

AMMONIA.
Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

MR. W. B. MIMMACK, for many years Secretary, Manager, and Accountant of the Crays Gas Company (111 Millions), now in Amalgamation, seeks APPOINTMENT in any or all of these Offices.
St. Paul's Cray, KENT.

YOUNG Engineer, G.Inst.Mech.E.,
Student Institution of Gas Engineers, Trained on thoroughly up-to-date Gas-Works, and having a good Capacity for Business, is open to accept REPRESENTATIVE POSITION on a First-Class Firm of Carbonizing or Lighting Engineers.
Address No. 5079, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS AND MANAGERS.
ADVERTISER (Age 28), Articled under, and Three Years Chief Assistant to, an Architect, would be prepared to Work hard in any Capacity that afforded reasonable prospects of a satisfactory permanent position. Has had a Wide General Experience, including Mills, Warehouses, Transferring Machinery, Reinforced Concrete, &c., and is thoroughly Competent to prepare Drawings, Specifications, Quantities, &c. Good Draughtsman, Surveyor, and Mechanical Engineer. Unexceptionable References and Testimonials.
Address No. 5078, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING Manager required for the Company's New Gas and Water Works.
Apply, by letter, stating Wages and enclosing *copies* of References, to the SECRETARY, Meldreth and Melbourn District Gas and Water Company, Norfolk House, Norfolk Street, LONDON, W.C.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

URBAN DISTRICT OF SHIPLEY.

APPOINTMENT OF ENGINEER-MANAGER OF GAS-WORKS.

THE Council invite Applications from Duly Qualified Persons for the Post of GAS ENGINEER and MANAGER of the Gas-Works.

Make of Gas, 180 Millions.

Salary, £250 per Annum.

The Person Appointed is to devote the whole of his Time to the duties of the Office.

Applications, stating Age, present Occupation, and Qualifications, with *copies* of not more than Three recent Testimonials, must be delivered to the undersigned, endorsed "Gas Manager," not later than Saturday, the 17th of April, 1909.

Canvassing, either directly or indirectly, will be regarded as a Disqualification.

I. Lindow,
Clerk of the Council.

Council Offices, Shipley,
Yorks, March 29, 1909.

TO BE LET for Show-Rooms, Work-shops, Warehouses, &c., Two Magnificent FLOORS, containing 9300 Square Feet and 3600 Square Feet respectively, in Alfred Place and Chenies Street, Tottenham Court Road, W.C. Fireproof Construction. Built for Heavy Weights. Well Lighted. Lift.

Also Vacant SITE Adjoining, about 9000 Square Feet, on 99 Years' Building Lease.

Apply A. J. Caley and Son, Limited, Chenies Street, London, W.C.

PURIFIERS FOR SALE.

FOR SALE—Four 10-feet Square Puri-fiers, with Dempster's Dry-face Centre-Valve and Connections Complete.

Offers to H. Lees, Gas Office, Hexham.

FOR SALE, Cheap, the undermentioned GAS PLANT:—

Kirkham's "STANDARD" WASHER-SCRUBBER to pass 250,000 cubic Feet per diem.
GASHOLDER, 3-Lift, 50 ft. dia., cap. 128,000 c.f.
EXHAUSTERS, 10,000 and 8000 cub. ft. per Hour.
4-inch Cast-Iron Vertical CONDENSER.
Wrought-Iron SCRUBBER, 9 ft. high by 3 ft.
Donkin's VALVES, 12-inch, 10-inch, 6-inch.

Apply to Samuel White and Son, 60, Queen Victoria Street, London, E.C.

GAS-EXHAUSTER FOR SALE.

FOR SALE—A Gas-Exhauster with Steam-Engine Complete, made by Messrs. Gwynne and Co., of Essex Street, Strand, in 1874, designed to pass 21,000 Cubic Feet per Hour at a speed of 100 Revolutions per Minute.

The Exhauster has recently been overhauled and is in good order. It may be seen working at the Lowestoft Gas-Works by appointment with Mr. Joseph Hawksley, of 2, York Road, Great Yarmouth, to whom offers should be addressed.

April, 1909.

SECOND-HAND PLANT for Sale, in good order—

Six 8 ft. square PURIFIERS.
Six 14 ft. square PURIFIERS.
Three 12 ft. by 10 ft. PURIFIERS.
One 20 ft. by 10 ft. PURIFIER.
One 18 ft. 6 in. by 14 ft. 6 in. PURIFIER.
8-inch PIPE CONDENSERS.
STATION METER, 12,500 Cubic Feet per hour.
STATION METER, 6-inch Connections.
300-Light METER, 4-inch Connections.
EXHAUSTER and ENGINE, 10,000 Cubic Feet per hour.
EXHAUSTER and ENGINE, 20,000 Cubic Feet per hour.
EXHAUSTER and ENGINE, 7-inch Connection.
SCRUBBER, 16 ft. high by 4 ft. diameter.
SCRUBBER, 30 ft. high by 5 ft. diameter.

Particulars from W. Darling and Co., 158, St. Vincent Street, Glasgow.

MANUFACTURING PLANT FOR SALE.

THE Directors of the Cardiff Gaslight and Coke Company invite OFFERS for the Purchase of PLANT, in good Working Condition, at their Bute Terrace Works, comprising:

Retort Fittings.
Condenser.
Ammoniacal Liquor Scrubber.
Tower Scrubber.
One Pair of Exhausters.
One Set of Four Purifiers.

The whole suitable for Gas-Works producing Half-a-Million Cubic Feet per Day.

Schedule, containing detailed Measurements and all Particulars, may be obtained on Application to Mr. H. Morley, C.E., Gas-Works, Cardiff.

Tenders to be received not later than the first post Saturday, May 1, next.

BOROUGH OF MOSSLEY.

THE Gas Committee of the Borough of Mossley invite TENDERS for the Supply of Screened GAS COAL.

Specifications and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Gas Coal," and addressed to the Chairman of the Gas Committee, Gas-Works, Mossley, must be delivered not later than Wednesday morning, April 28, 1909.

James Taylor,
Engineer and Manager.

Gas-Works, Mossley,
April 7, 1909.

BRIDGEWATER COLLIERIES COKE WORKS.

(The Earl of Ellesmere.)

TENDERS are invited for the Crude BENZOL produced at the above Works (estimated at 450 Gallons per day) testing 80 per cent. at 120° C., during the next Three, Six, Nine, or Twelve Months, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway, or at the Brackley Siding on the Little Hulton Mineral Branch of the London and North Western Railway.

Tenders, endorsed "Tender for Crude Benzol," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Offices, 4, Chapel Walks, Manchester, not later than the 26th inst.

Manchester, April 6, 1909.

BOROUGH OF EAST RETFORD.

TENDERS FOR GAS COAL.

THE Gas Committee of the above are open to receive TENDERS for the Supply of 7000 Tons of Freshly-Worked Screened GAS COAL or NUTS to be delivered during the Twelve Months ending June 30, 1910, as may be required.

Forms of Tender and any further Particulars may be had on Application to the undersigned.

Tenders to be sent, addressed to the Chairman of the Gas Committee, endorsed "Tender for Gas Coal," on or before April 30, 1909.

J. B. Fenwick,
Engineer and Manager.

Gas and Water Offices,
East Retford, April 6, 1909.

MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors of the above Company are prepared to receive TENDERS for the Purchase of the Surplus TAR produced at their Gas-Works for a Period of Twelve Months from May 1, 1909.

Probable quantity, 400,000 Gallons.

Further Particulars and Forms of Tender may be obtained on Application to the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman and Directors, must be delivered at the Gas-Works not later than April 30, 1909.

The Directors do not bind themselves to accept the highest or any Tender.

B. R. Green,
Engineer and Manager.

Gas-Works, Mitcham,
April 8, 1909.

NEWPORT (MON.) GAS COMPANY.

TENDERS FOR COAL.

THE Directors invite Tenders for the Supply of about 30,000 Tons of best GAS COALS for Twelve Months, commencing July 1, 1909, to be delivered on the Company's Sidings at their Mill Street and Crindau Works, in such quantities and at such times as may be directed by the Company's Engineer, from whom further Information may be obtained.

Tenders will be received for the whole or part of the above quantity.

Tenders, endorsed "Coals," to be delivered at the Offices of the Company not later than Wednesday, April 21, 1909.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
T. H. Hazell,
Secretary.

Newport, Mon., April 8, 1909.

RHYL URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

THE Rhyl Urban District Council are prepared to receive TENDERS for the Supply of 4800 Tons of Screened COAL, to be delivered f.o.r. Rhyl, during the Eleven Months ending the 30th of June, 1910, in such Quantities and at such times as may be required.

Form of Tender and Particulars of Conditions may be obtained on Application to Mr. Leonard G. Hall, Assoc.M.Inst.C.E., Gas Engineer.

Sealed Tenders, endorsed "Tenders for Coal," to be delivered to me, the undersigned, not later than the 28th of April, 1909.

Approved security will be required.

The Council do not bind themselves to accept the lowest or any Tender.

Arthur Rowlands,
Clerk to the Council.

Council Offices, Clwyd Street,
Rhyl, April 10, 1909.

WALLASEY URBAN DISTRICT COUNCIL.

(Gas and Water Department.)

TO COLLIERY PROPRIETORS AND OTHERS.

THE Wallasey Urban District Council are prepared to receive TENDERS for the Supply of about 46,000 Tons of Screened GAS COAL and CANNEL, delivered in accordance with the Terms of the Specification prepared by, and obtainable at the Office of, the Engineer, Mr. J. H. Crowther, Dock Road, Seacombe.

Sealed Tenders, addressed to the undersigned, and endorsed "Tender for Coal, Gas and Water Department," to be delivered per post, at my Office, as below, no later than the morning of Wednesday, the 21st inst.

The Contractor or Contractors will be required to enter into a Bond with approved Sureties, for the due performance of his or their Contract.

The Council do not bind themselves to accept the lowest or any Offer.

By order,
H. W. Cook,
Clerk and Solicitor.

Public Offices, Egremont,
Cheshire, April 5, 1909.

LEEDS CORPORATION GAS-WORKS.

THE Gas Committee are prepared to re-ceive TENDERS for the Supply of about 12,000 Tons of BEST CRAVEN or DERBYSHIRE LIME, required for the Purification of Gas at the several Gas-Works during the Twelve Months commencing on the 1st of May 1909, also for the Supply of CAST-IRON PIPES, RETORT CASTINGS, &c.

Specifications and Forms of Tender may be obtained on Application to the undersigned.

Sealed Tenders, suitably endorsed, addressed to the Town Clerk, Town Hall, Leeds, to be delivered not later than Saturday, the 24th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. Townsley,
General Manager.

Gas Offices, East Parade,
Leeds, April 10, 1909.

ROTHWELL URBAN DISTRICT COUNCIL, NORTHAMPTONSHIRE.

TENDERS FOR GAS COAL.

THE above Council invite Tenders for the Supply of the whole or part of about 1400 to 1600 Tons of Best Screened GAS COAL and NUTS delivered at Desborough Station (Midland Railway) in such quantities as may be required by the Council's Gas Manager during the Year ending June 30th, 1910.

Further Particulars can be obtained from Mr. A. T. Harris, the Council's Gas Manager.

Sealed Tenders, endorsed "Tender for Coal," must reach the undersigned not later than Saturday, the 24th inst.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
Thomas Tozer,
Clerk to the Council.

Market House, Rothwell
(Northants), April 8, 1909.

ROYAL BURGH OF INVERNESS.

CONTRACTS FOR COAL, LIME, INSURANCE, AND FREIGHT.

THE Inverness Gas Commissioners are prepared to receive OFFERS for the Supply of 10,000 Tons of CANNEL and GAS COAL, to be delivered f.o.b. at Ports on the Firth of Forth, or delivered free at Inverness Goods Station, over a period of Six or Twelve Months, at the Commissioners' Option; also, 300 Tons of LIME SHELLS, to be delivered free at Inverness Goods Station; also, FREIGHT and INSURANCE on COAL from Firth of Forth Ports to Upper Harbour, Inverness, and for the Discharging of Coal into Carts or Waggons at the Harbour, and Trimming at the Gas-Works when required.

Further Particulars and Forms of Tender may be obtained by Applying to the Manager at the Gas-Works.

Tenders, endorsed and addressed to Kenneth Macdonald, Esq., Clerk to the Commissioners, will be received up to Saturday, the 24th curt.

The Commissioners do not bind themselves to accept the lowest or any Tenders.

Gas-Works, Inverness,
April 6, 1909.

UXBRIDGE GAS COMPANY.

TENDERS FOR COAL.

THE Directors of the Uxbridge Gas Company invite TENDERS for the Supply of about 8000 Tons of Clean and Fresh Wrought GAS COAL, deliveries of which are to commence in July, 1909, and finish in June, 1910.

Tenders to be made out for the above Quantity of the best description of Screened or Unscreened Gas Coal, either in whole or part, from, or divided between the Durham or South Yorkshire Pits, delivered by Barge, free alongside the Company's Works on the Grand Junction Canal, or by Rail to Uxbridge Station (Great Western Railway).

Tenders are to state the name of the Pits from which the above Description of Coal will be supplied.

Deliveries to be according to the Instructions of, and to the entire satisfaction of, the Company's Engineer.

Tenders to be received on or before April 20, addressed to the Chairman, Gas Offices, Uxbridge Middlesex, and endorsed "Tenders for Coal."

No Form of Tender supplied.

George J. Bristow,
Secretary.

Uxbridge, Middlesex,
April, 1909.

TAUNTON RURAL DISTRICT COUNCIL WATER SUPPLY.

TO CONTRACTORS AND OTHERS.

TENDERS are invited by the above Council for the following, in connection with the Carrying of Water to, and its Distribution over, the Parish of Stoke St. Gregory within the district.

(*a.*) The Supply of about 16 Miles of CAST-IRON PIPING.
(*b.*) The Supply of SLUICE VALVES, HYDRANTS, &c.
(*c.*) The LAYING and FIXING of the above Pipes and Fittings.
(*d.*) The Construction of a 50,000 Gallon BRICK RESERVOIR.

Specifications and Forms of Tender may be obtained of the Engineers, Messrs. Merryweather and Sons, Greenwich Road, London, S.E., on payment by Cheque of Two Guineas for each Section, which will be returned on receipt of a *bond-fide* Tender.

Tenders to be delivered to the undersigned on or before Friday, the 30th of April inst., at whose Office, Plans may be inspected, as well as at the Offices of the Engineers.

(Signed) W. F. B. Dawe,
Clerk to the said Council, Taunton.

Union Offices,
Taunton.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(Incorporated by Act of Parliament.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 4th day of May next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors; a Dividend declared for the Half Year ended the 31st of December, 1908; an Auditor elected in the place of the late Montagu Somes Pilcher, Esq.; and the usual Ordinary Business of such Meeting transacted.

Notice is Hereby also Given, that the REGISTER OF TRANSFERS OF CAPITAL STOCK WILL BE CLOSED from the 20th inst. to the 4th prox., both days inclusive.

By order of the Board,
Robt. W. Wilson,
Secretary.

Offices: 21, Austin Friars,
London, E.C., April 12, 1909.

FOR SALE.

THE Patents of my "KOBOLD" CHARGING-MACHINE for Horizontal Gas-Retorts, which, on the occasion of the visit of the English Gas Engineers to the Tegel, or No. VI., Gas-Works at Berlin, excited the Greatest Interest, and of which the Faultless Working was recognized, as well as of my "SCHLANGE" DRAWING MACHINE for Single Horizontal Retorts are TO BE SOLD on most Favourable Terms.

C. Eitle.

Maschinenfabrik, Stuttgart.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 500 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 27, at Two o'clock, in Lots.

Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
GRAYS AND TILBURY GAS COMPANY.

NEW ISSUE OF 400 £10 "B" SHARES
AND
£2000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 27, at Two o'clock, in Lots.

Particulars of the Auctioneers, as above.

By order of the Directors of the
ASCOT DISTRICT GAS AND ELECTRICITY COMPANY.

NEW ISSUE OF £4000 FOUR-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK,
AND
200 £10 NEW ORDINARY SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 27, at Two o'clock, in Lots.

Particulars of the Auctioneers, as above.

Estate of Thos. Hersey, Esq., decd.

MESSRS. A. & W. RICHARDS will SELL BY AUCTION, at the Mart, E.C., on Tuesday, April 27, at Two o'clock, in Lots.

480 £20 FULL-YPAID SHARES
IN
KIRKHAM, HULETT, AND CHANDLER, LIMITED.

Particulars of the Auctioneers, as above.

THE GAS-WORKS, KINGSCLERE.

MR. A. W. NEATE is instructed by the Liquidator, to SELL BY AUCTION, at the Swan Hotel, Kingsclere, Hants, on Tuesday, April 20, 1909, at Four o'clock precisely,

THE KINGSCLERE GAS-WORKS,

comprising Manager's House, Retort-House, Purifier, Condenser, Scrubber, Gasholder, Holder Tank, Stores, Outbuildings and Gardens, also

THE GAS MAINS AS LAID,

with Connections to Houses, Street Lamps, Columns, Brackets, Service Pipes, Meters, &c., Purchaser to take to the Working Plant, Tools, and Stock by Valuation.

Possession on completion of Purchase.

Particulars and Conditions of Sale may be had at the Place of Sale, of J. Barnes, Esq., Solicitor, Kingsclere, and of Mr. A. W. Neate, Auctioneer, Newbury and Hungerford.

Now Ready, Price 15s., Limp Cloth.

TWENTY-EIGHTH YEAR.

ANALYSIS OF THE ACCOUNTS
OF SOME OF THE
Principal Water Undertakings
OF THE
UNITED KINGDOM,
NAMELY:
The Undertakings of the Metropolitan Water Board, and 24 Provincial Water Undertakings
FOR THE YEAR 1907-1908.

Compiled by
WOOD, DREW, & CO.,
Chartered Accountants.

London:
WALTER KING, 11, Bolt Court, Fleet Street, E.C.

BIRTLEY IRON COMPANY,
Established 1890,
Owners of the Birtley Iron Works and Pelaw Main Collieries,
GENERAL ENGINEERS & IRONFOUNDERS.

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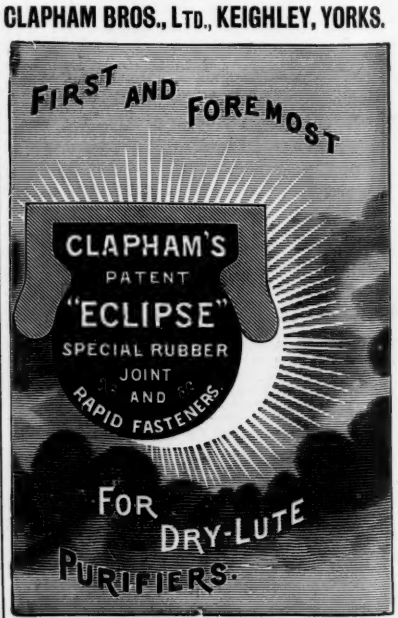

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